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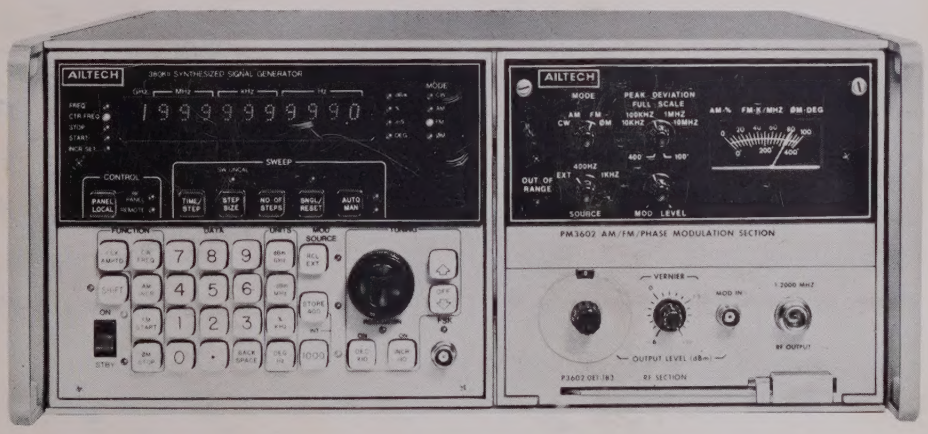
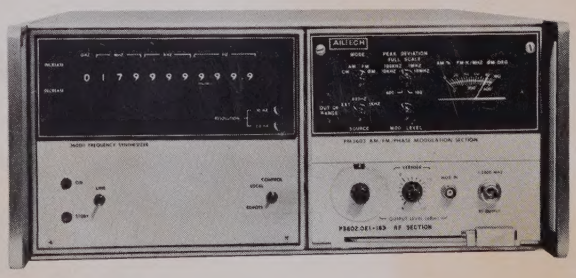
360/380 FREQUENCY SYNTHESIZERS

P3602.0E1 RF SECTION PLUG-IN





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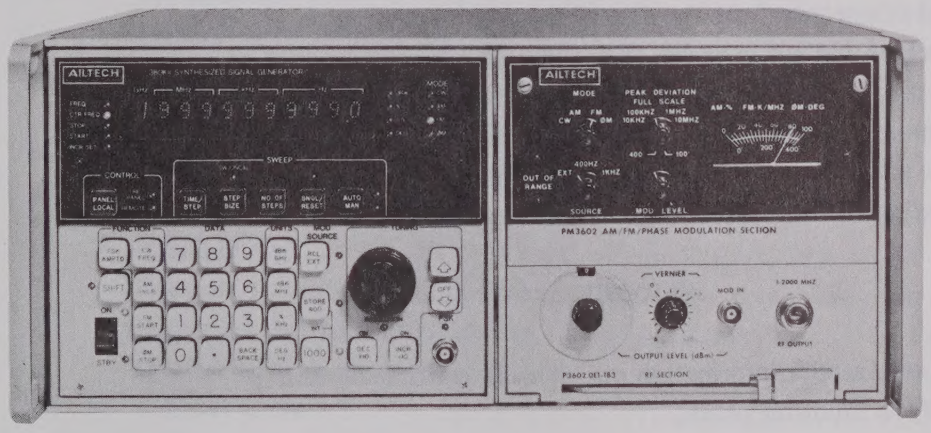

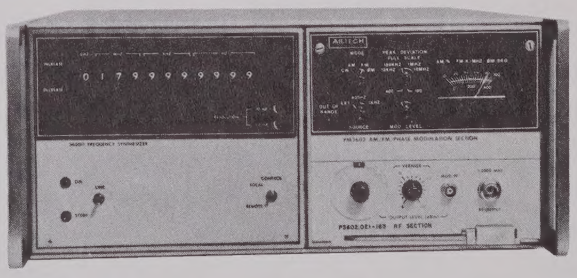

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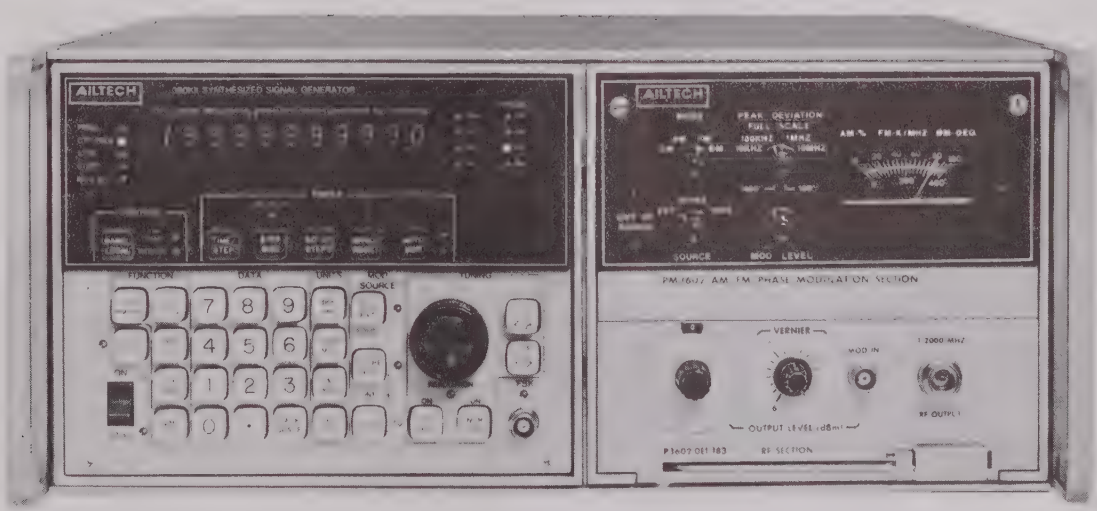
360 SYNTHESIZED SIGNAL GENERATOR



380 SYNTHESIZED SIGNAL GENERATOR

Figure 1-1. P3602.0E1-183 RF Sections
Shown Mounted in 360 and 380 Synthesizers

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual contains general information, installation, operation and maintenance information for the P3602.0E1 RF Section and the PM3601 External AM Section. The P3602.0E1 RF Section is a plug-in assembly for use with the 360D11 and 380K11 Frequency Synthesizer Mainframe, the 3600E1 Frequency Extender, and a Modulation Section of the PM3600 Series. Figure 1-1 shows the RF Section with a PM3602 External AM/FM/Phase Modulation Section installed. The modulation section is a subordinate plug-in assembly to the RF Section.

1-3. The organization of this manual is divided into five sections as follows:

a. Section 1, GENERAL INFORMATION, provides brief physical and functional descriptions of the RF Section, pertinent specifications, a list of component subassemblies, accessories, and a list of test equipment required for maintenance.
b. Section 2, INSTALLATION, provides information necessary for unpacking, preparation for use, and initial checkout.
c. Section 3, OPERATION, provides information on how to operate the RF Section in conjunction with the Frequency Synthesizer to obtain a desired output. It also contains a simple operator's maintenance procedure for checking out the equipment.
d. Section 4, MAINTENANCE, provides all information necessary to troubleshoot, repair, and adjust the RF Section.
e. Section 5, REPLACEABLE PARTS LIST, provides a complete list of all parts contained in the RF Section and the External AM Section.

1-4. DESCRIPTION

1-5. The P3602.0E1 RF Section, used in conjunction with the 360D11 or 380K11 Mainframe, 3600E1 Frequency Extender, and a Modulation Section of the PM3600 Series, provides a 1.0 MHz to 1999.99999 MHz output signal in 1 Hz steps at frequencies below 60 MHz, and 10 Hz steps above 60 MHz. Mainframe Option 001 increases resolution by a factor of ten (10). Output power is continuously variable by means of a front panel calibrated dial from 0 to +10 dBm.

1-6. The only operator control is the OUTPUT LEVEL (dBm) dial which provides a means of setting the RF output power at any level between 0 and +10 dBm. RF Section specifications are shown in Table 1-1.

TABLE 1-1. RF SECTION SPECIFICATIONS

PARAMETER	SPECIFICATION
FREQUENCY RANGE	1.0 to 1999.99999 MHz
FREQUENCY RESOLUTION Output Frequency / Standard / Mainframe Option 001 < 60 MHz / 1 Hz / 0.1 Hz > 60 MHz / 10 Hz / 1.0 Hz	
FREQUENCY ACCURACY AND STABILITY	Determined by reference oscillator (±3 x 10^{-8}/24 hours with mainframe option 002, ±1 x 10^{-9}/24 hours with mainframe option 003).
SWITCHING TIME	(2) Less than 20 microseconds to be within 0.01 radians of the final phase at the new frequency.
SIGNAL TO AM NOISE RATIO	70 dB below the output in a 30 kHz band excluding ±0.5 Hz centered on the signal.
HARMONICS: (1)	<-20 dBc minimum, CF > 3 MHz <-15 dBc minimum, CF < 3 MHz
SUBHARMONICS AND MULTIPLES $\frac{f}{2}, \frac{3f}{2}$ etc :	 <1000 MHz N/A >1000 MHz -20 dBc minimum
SIGNAL TO PHASE NOISE RATIO:	Residual integrated phase noise in a 30 kHz band centered on the signal excluding ±0.5 Hz around the signal, is typically 78 dBc to 60 MHz, degraded at higher frequencies to 52 dBc above 1000 MHz. See Spectral Purity.

(1) For output levels below +5 dBm with Attenuator Option.

(2) Switching time for a frequency step >10 MHz to <10 MHz is less than 80 μsec.

TABLE 1-1. RF SECTION SPECIFICATIONS (Cont)

PARAMETER	SPECIFICATION				
SPECTRAL PURITY:					
Output Frequency	Spurious Signals	Guaranteed SSB Phase Noise at Offset Frequency			
(MHz)	(dBc)	1.0 kHz (dBc/Hz)	10 kHz (dBc/Hz)	100 kHz (dBc/Hz)	S/N dBc
1-60	-100	-121	-126	-131	-78
60-100	-98	-119	-124	-129	-76
100-200	-95	-113	-118	-123	-70
200-400	-86	-107	-112	-117	-64
400-1000	-80[1]	-101	-106	-111	-58
1000-2000	-74[2]	-95	-100	-105	-52

OUTPUT CHARACTERISTICS:	STANDARD	183 OPTION
Output Level	+10 dBm to 0* dBm Local only	+10 dBm to -136 dBm Local and Remote**
Output Accuracy	±2.5 dB	±3 dB, +10 to -50 dBm ±3.5 dB, -50 to -136 dBm
Leveling	±2.0 dB	±2.5 dB
Output Level Switching Time	N/A	≤10 ms (< 1 ms for any change on same attenuator range)
Programming Resolution	N/A	0.5 dB
Impedance	50 ohms	
VSWR	< 2.6	< 2.6 above -6 dBm < 1.4 below -6 dBm

*AM modulation specifications reduced above +7 dBm.

**AM modulation specifications reduced above +5 dBm.

(1) For 950-1999.99 ... MHz, a spurious could appear from 1050-1150 MHz, <-60dBc.
(2) For 1600-1680 ... MHz, a spurious could appear from 1470-1550 MHz, <-55 dBc. For 1900-1999.99 ... MHz, a spurious could appear from 1700-1950 MHz, <-60 dBc.
For 1800-1999.99 ... MHz, a spurious could appear 610 ± 1 MHz below the carrier, <-55 dBc.

TABLE 1-1. RF SECTION SPECIFICATIONS (Cont)

PARAMETER	SPECIFICATION
MODULATION:	With PM3601 Modulator, External AM only. With PM3602, AM, FM, ØM and Pulse (See Specifications in PM3602 Manual)
MODULATION DEPTH: (PM3601 or PM3602)	0 - 90% (2)
MODULATION RATE: (PM3601 or PM3602)	
0 - 70%	DC - 10 kHz, 2 MHz < CF < 10 MHz DC - 80 kHz, CF ⩾ 10 MHz (3)
0 - 90%	DC - 5 kHz, 2 MHz < CF < 10 MHz DC - 50 kHz, CF ⩾ 10 MHz (2)
SIZE:	Plug-In to fit the 360 or 380 Mainframe.
WEIGHT:	20 pounds (8.6 kilograms) net 24 pounds (11 kilograms) shipped

(2) For output levels below +7 dBm. With 183 Attenuator Option, for levels below +3 dBm.
(3) For output levels between +2 and +7 dBm. With 183 Attenuator Option, for levels between 0 and +5 dBm.

1-7. OPTIONS

1-8. Option 183 adds a 10 dB step attenuator with a range of 130 dB and provides output level control from +10 to -136 dBm. Attenuation is controlled by a front panel control or it may be programmed from the remote input at the rear of the RF Section. Adjustment over this range is essentially continuous under manual front panel control, or is in 0.5 dB steps under remote program control. Instructions pertinent to this option are contained in Appendix A. See Table 1-1 for output characteristic specifications.

1-9. ACCESSORIES

1-10. A Service Kit (P/N 299252) is available for maintenance purposes Figure 1-2. Table 1-2 lists the items contained in the kit. The items marked with an asterisk are applicable to the RF Section.

1-11. TEST EQUIPMENT

1-12. Table 1-3 lists the recommended test equipment for use in testing, adjusting, and servicing the RF section.

Figure 1-2. Service Kit

TABLE 1-2. SERVICE KIT ITEMS P/N 299252

FIGURE 1-2 ITEM NO.	QTY	PART NO.	DESCRIPTION
1*	1	293198-1	TUNING TOOL
2	1	299225-1	PWB, JUMPER, L.O. BCD
3	1	299545-1	PWB ASSY, BCD EXTENDER
4	1	299547-1	PWB ASSY, PWR SUPPLY EXTENDER
5*	1	293198-2	TUNING TOOL
6*	2	299543-1	CABLE ASSY, SMB PLUG/SMB JACK
7*	2	299543-2	CABLE ASSY, SMB PLUG/SMB PLUG
8*	1	299543-3	CABLE ASSY, SMB RT ∠ PLUG/SMB RT ∠ PLUG
9*	1	299543-4	CABLE ASSY, SMB PLUG/BNC PLUG
10*	1	299822-1	CABLE ASSY, PLUG IN EXTENDER
11	1	294291-1	M BLOCK EXTRACTION TOOL
12	1	299821-1	CABLE ASSY, MAINFRAME JUMPER
13	1	299820-1	CABLE ASSY, MODULATION EXTENDER
14*	1	294677-2	ADAPTER, BNC JACK/SMB JACK
15*	1	294676-2	ADAPTER, BNC JACK/SMB PLUG
16*	1	294678-1	ADAPTER, SMB TEE
17	1	294653-1	ADAPTER, SMA PLUG/PLUG
18	1	294652-1	ADAPTER, SMA JACK/JACK
19	1	294658-1	ADAPTER, BNC JACK/SMA JACK
20	1	296551-1	CABLE ASSY, 50 POSITION
21	1	296551-2	CABLE ASSY, 36 POSITION

*Applicable to RF Section

TABLE 1-3. RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATION	RECOMMENDED MODEL
Spectrum Analyzer	0.001 to 12.4 GHz 100 dB display range with preselection and variable persistence.	AILTECH 757
Fixed, Coaxial Attenuator	6 dB, 1 MHz to 2000 MHz, ± 0.3 dB	Narda 757C
Frequency Counter	300 Hz to 2000 MHz	Systron Donner 6054A
Oscilloscope	DC-100 MHz	Tektronix 454
AC Voltmeter	True RMS reading, digital indication 10 Hz to 1 MHz ±1%	Boonton 93AD
RF Power Meter	200 kHz to 2000 MHz ±0.2 dB	Boonton 42B
Test Oscillator	10 Hz to 100 kHz, 0.05% dist.	General Radio 1309-A
Prescaler	600 MHz ÷ 10, ÷ 100	Weston 6853
Service Kit		AILTECH 299252 See Table 1-2 and Figure 1-2

1-13. RF SECTION SUBASSEMBLIES

1-14. Table 1-4 lists the reference designation, title, and part number of the assemblies and subassemblies contained in the RF section.

TABLE 1-4. RF SECTION ASSEMBLIES AND SUBASSEMBLIES

REFERENCE DESIGNATION	TITLE	PART NUMBER
A1	10-60 MHz Comb Generator Assembly	295531
A1A1	10-60 MHz Comb Generator PC Board	295620
A1A2	Comb Converter PC Board	298986
A2	365 MHz Filter Amplifier Assembly	298972-2
A2A1	365 MHz Input PC Board	298965-2
A2A3	365 MHz Buffer PC Board	298993-2
A2A4	Tuning Capacitor	298982
A2A5	365 MHz Output Converter PC Board	298983-2
A3	Level Reference/Decoder PC Board Without 183 Option	296754-1
A3	Level Reference/Decoder PC Board With 183 Option	296754-2
A4	395-405 MHz Filter Amplifier Assembly	298971-3
A4A1	395-405 MHz Input PC Board	298981
A4A2	395-405 MHz Output PC Board	298979-2
A5	VHF Oscillator Assembly	295529
A5A1	VHF Oscillator PC Board	295596
A5A2	305-395 MHz Isolation/Amplifier PC Board	299264
A5A3	345-395 MHz Switched Isolation Amplifier PC Board	298988
A5A4	Switched Isolation Doubler PC Board	298989-2
A6	610-710 MHz Filter Converter Assembly	295511-1
A6A1	610-710 MHz Converter PC Board	295505
A6A2	Bandpass Filter PC Board	298459
A7	Multiplier Section Assembly	295536
A7A1	390 MHz Power Amplifier PC Board	296636
A7A2	X10 Multiplier/Filter PC Board	295947
A7A3	610/710 MHz Amplifier PC Board	295290
A7A4	X5 Multiplier Filter PC Board	295260
A8	Output Section Assembly	295530
A8A1	Frequency Scaler PC Board	295868-2
A8A2	Output Amplifier PC Board	295451-2

TABLE 1-4. RF SECTION ASSEMBLIES AND SUBASSEMBLIES (Cont)

REFERENCE DESIGNATION	TITLE	PART NUMBER
A9	Logic Converter PC Board (360D11 and 380K11)	295319-4
A10	Stationary Panel Assembly Without 183 Option	295459-2
A10	Stationary Panel Assembly With 183 Option	295696-2
A11	Plug-In Power Distribution PC Board	299292
A12	Attenuator (182 and 183 Option)	295599
A13	Attenuator Control Board (183 Option Only)	295683
A14	Not Used	
A15	Mixer	296356-1
A16	Filter, Low Pass, 2 GHz	295687-2
A17	Filter, Band Pass, 3300 MHz	295617
A18	Filter, Band Pass, 4000 MHz	295644
A19	Filter, Low Pass, 4100 MHz	295686
A20	Filter, Low Pass, 4500 MHz	295940-1

SECTION 2

INSTALLATION

2-1. INTRODUCTION

2-2. This section provides unpacking, preparation for use, and initial checkout instructions for the RF section.

2-3. UNPACKING

2-4. No special instructions or precautions are necessary for unpacking when the RF section is shipped installed in a mainframe with a modulation section in place. If the RF section is ordered and shipped separately, reasonable care should be exercised in removing the equipment from its packing container to prevent damage to the alignment pins on the plug-in connectors. These connectors are located on the bottom of the unit towards the front panel.

CAUTION

Do not attempt to assemble the RF section to a mainframe if the connector alignment pins are bent, since this could cause extensive damage to the plug-in connectors.

2-5. PREPARATION FOR USE

2-6. If the RF section was ordered and shipped with a modulation section, the two units are assembled at the factory prior to shipment. Physically, the modulation section makes up the upper half of the RF section front panel. If this unit is installed, proceed directly to paragraph 2-8.

2-7. The modulation section is best installed with the RF section either completely removed from or partially inserted in the mainframe. To install the unit, proceed as follows:

a. Insert modulation interface connector P3 through the front panel opening, and seat the connector in mating connector J3 on the RF section. Secure the connector by finger-tightening the captive thumbscrews on P3.
b. Place the lower edge of the modulation section panel on the upper edge of the RF section panel. Make certain the metal tab on the modulation section panel is behind the RF section panel.
c. Pivot the panel back into the recess provided. Secure the unit by finger-tightening the captive thumbscrews on the modulation section front panel.
d. For PM3602 only, attach rear support bracket of modulation unit to RF section with number six screw, nut, and lockwasher.

2.8 To install the RF Section, proceed as follows:

a. Set the Mainframe Resolution switch, 1A9S1, located on the logic PC board to one of four positions, 0.1, 1.0, 10 or 100 Hz, to match the resolution of the mainframe. For a 360D11, the mainframe resolution is designated by the marking of the lower of the two "Resolution" indicators on the mainframe front panel. For the 380K11, (after initial turn on), the mainframe resolution is designated by programming any frequency below 60 MHz. Note the least significant figure on the frequency display.
b. Carefully slide the unit about halfway into the slot provided on the right side of the mainframe.
c. Making certain the locking lever is at about a 45 degree angle with the front panel, fully seat the unit. The locking lever should pivot in towards the panel.
d. Lock the plug-in assembly in place by depressing the lever until the latch engages.

2-9. INITIAL TURN-ON

2-10. Section 3 describes the location and function of the controls and connectors on the RF section. Other controls, indicators, and connectors referenced in the following procedures are located and described in the 360D11 Mainframe and 380K11 Mainframe handbook.

CAUTION

To prevent damage to the instrument, make line voltage selection before connecting line power. Also ensure that the line power cord is connected to a power circuit with a protective earth ground.

FOR 360D11

a. Set LINE switch S1 on the Frequency Synthesizer to 115V or 230V depending on the power source being used.
b. Set LINE switch on the Frequency Synthesizer front panel to STDBY.
c. Set CONTROL switch to LOCAL.
d. Connect the power cable at the rear of the Frequency Synthesizer to an uninterrupted source of 115/230 Vac, single-phase, 48- to 66-Hz power. The STDBY light on the front panel should go on.
e. Allow the Frequency Synthesizer to warm up for a minimum of one hour.

FOR 380K11

a. Set power PC card at rear of frequency synthesizer to 120 or 240 volts depending on power source being used. Use proper fuse as indicated.
b. Set ON/STBY switch on frequency synthesizer front panel to STBY.
c. Connect power cable at rear of frequency synthesizer to an uninterrupted source of 115/230-Vac, single-phase, 48- to 66-Hz power (50 to 400 Hz with Option 004). With the ON/STBY switch in STBY position the STBY LED will light. With the ON/STBY switch in ON position the LED will light and the display will indicate.

d. If the signal generator contains Option 002 or 003 (internal frequency standard), allow the unit to warmup for a minimum of 1 hour.
e. With the ON/STBY switch to STBY position, all indicators except the STBY LED on the mainframe are blanked.

2-11. INITIAL CHECKOUT

2-12. After an initial warmup period of one hour, check that the Frequency Synthesizer and plug-in unit are operating properly by performing the following procedure:

a. Connect a frequency counter to the RF OUTPUT connector on the front panel of the RF Section.
b. Connect the (10 MHz REF OUTPUT 360 only) or (10 MHz REF OUT, 380 only) at the rear of the Synthesizer Mainframe to the external standard input of the counter.
c. Set the frequency selection switches on the Frequency Synthesizer front panel to any arbitrary frequency within the range of the RF section (1 MHz to 1999.99999 MHz).
d. Set the LINE switch to ON and check that the frequency counter indicates the selected frequency (±1 count).
e. Disconnect the counter and connect an RF power meter to the RF OUTPUT connector. Adjust the OUTPUT LEVEL control to +7 dBm. Set frequency to 1000.00000 MHz.
f. Check that the meter reads +7 dBm ±1.5 dB.(1)
g. Tune the synthesizer over the 1 MHz to 1999.99999 MHz range and check that the meter reads +7 ±2.0 dBm.(1)

(1) Standard Unit only. See Appendix A for operation with 183 Option.

SECTION 3

OPERATION

3-1. INTRODUCTION

3-2. This section provides operating instructions for the P3602.0E1 RF Section and the PM3601 External AM Section. Included are illustrations and descriptions of RF section controls and connectors. In addition, a simple operational procedure is provided for checking out the equipment.

3-3. CONTROLS, INDICATORS, AND CONNECTORS

3-4. Figure 3-1 shows the controls and connectors on the front and rear panels of the RF section. Table 3-1 lists the exact name of the control or connector, reference designation, and function.

3-5. REFERENCE OSCILLATOR STABILIZATION

3-6. The P3602.0E1 RF Section is used in conjunction with the 360D11 and 380K11 Frequency Synthesizer Mainframe as a precision signal source. The frequency accuracy and precision is dependent on an externally applied 5 or 10 MHz reference signal, or an optional, internal, oven-stabilized, 10 MHz crystal controlled oscillator. A minimum period of one hour is required for the oven to reach operating temperature and the specified stability is obtained after the oscillator is on for a minimum of 72 hours. For this reason, the Frequency Synthesizer is provided with an ON/STBY switch (360D11 Only) rather than a power on-off switch. The 380K11 is provided with a power ON/STBY switch. It is suggested that the unit be connected to an uninterrupted source of ac power and remain in the standby mode when not used. In this manner, the 10 MHz crystal oscillator is maintained at a constant temperature, and the frequency synthesizer is ready for immediate use without requiring a lengthy warmup period.

3-7. Before attempting to operate the synthesizer using the internal reference oscillator, make certain the BNC jumper cable between the 10 MHz INT STD OUT and the 5-10 MHz REF IN connectors at the rear of the mainframe is connected.

3-8. OPERATING INSTRUCTIONS (360D11 ONLY)

For 380K11, refer to paragraphs 3-8 through 3-45 in 380K11 Mainframe manual.

3-9. LOCAL MODE. After initial installation warmup (paragraph 3-5) the frequency synthesizer may be manually operated as follows:

a. Connect the instrument or circuit requiring a precision frequency input to the RF OUTPUT connector on the RF section front panel.
b. Set the mainframe CONTROL switch to LOCAL.

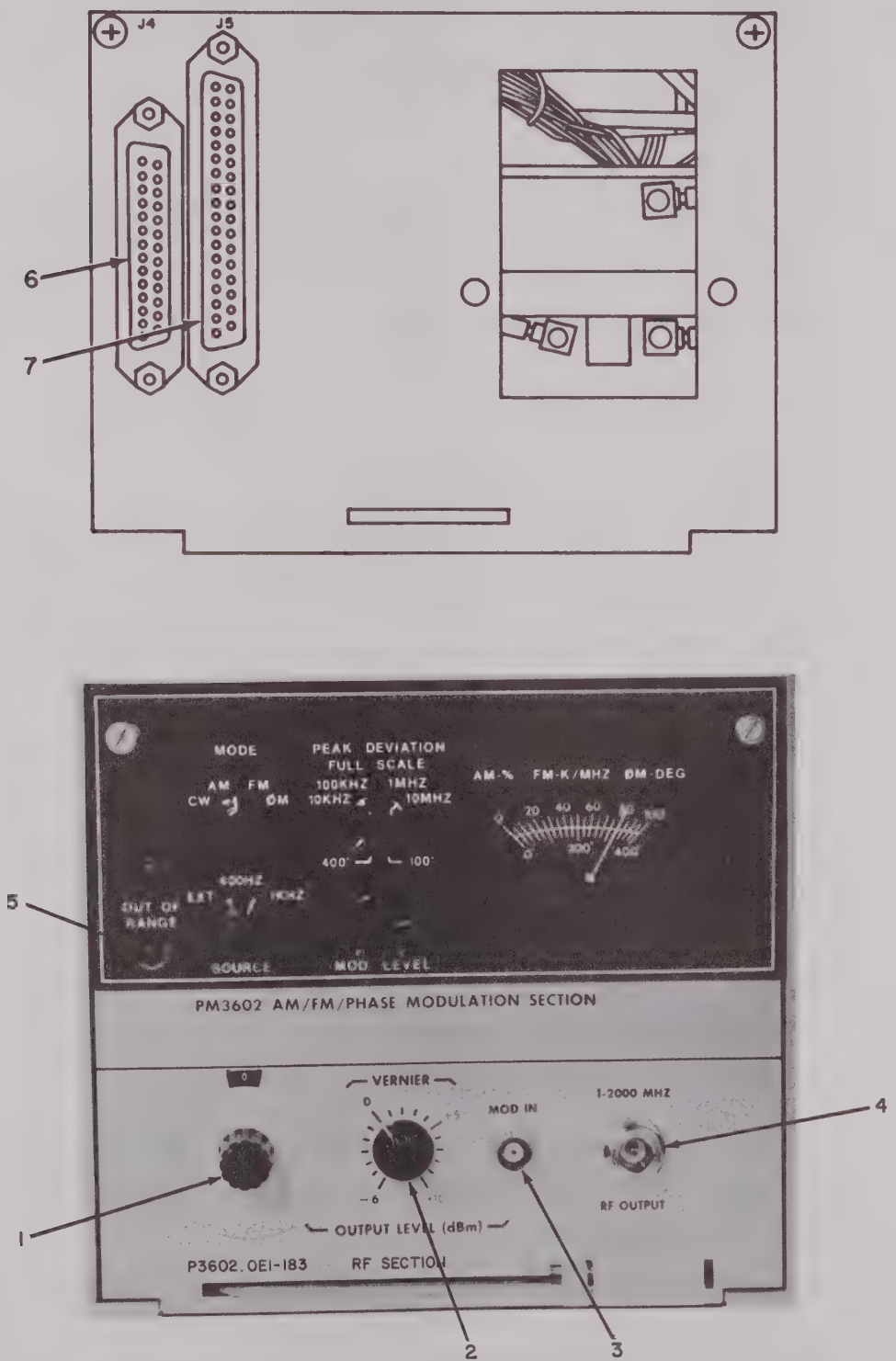


Figure 3-1. P3602.0E1 RF Section With PM3602 Modulator Front And Rear Panels

TABLE 3-1. RF SECTION CONTROLS, INDICATORS, AND CONNECTORS

Key (Figure 3-1)	Name	Reference Designation	Function
1	OUTPUT LEVEL (dBm) Control 10dB Steps (183 Option)	A10S1	Provides control of the signal amplitude in 10 dB steps. (183 Option Only)
2	OUTPUT LEVEL (dBm) VERNIER Control Variable	A10R1	Provides calibrated output control from 0 dBm to 10 dBm or from -6 dBm to 10 dBm with 183 option as shown.
3	MOD IN Connector	A10J2	Provides external input to the modulation plug in assy. 1 Volt RMS is required for 100% modulation or full scale modulation with the PM3602 installed.
4	RF OUTPUT Connector	A10J1	Provides 1 MHz to 2000 MHz output.
5	OUT OF RANGE* Indicator	DS1	When lit, indicates a frequency out of the 1 MHz to 1999.99999 MHz range of the RF section.
6	Remote Input Connector	J4	36 pin connector provides a means for applying level modulation control inputs.
7	Frequency Control Input Connector	J5	50 pin connector provides a means for applying frequency control inputs.

*Part of Modulation Section

c. Set the desired frequency into the frequency selection switches by operating each INCREASE and DECREASE switch.
d. Set the output level vernier (and the 130 dB Step Attenuator if Option 183 is installed) to the desired power output.
e. Set the LINE switch to ON.
f. Readjust frequency and power as required. If an invalid frequency is selected, this will be indicated by illumination of the OUT OF RANGE indicator on the RF section front panel.
g. To amplitude modulate the output with the PM3601 modulator installed, connect a DC to 100 kHz, 0 to 1 volt RMS signal to the MOD IN connector on the front panel of the RF section. The modulation level will be proportional to the level applied to the MOD IN connector. A 0.5 VRMS sinewave is equal to 50% AM.

3-10. REMOTE MODE. The output frequency, level, and modulation of the synthesizer may be controlled by remote programming inputs to remote input connectors J4 and J5 at the rear of the RF section. Remote level control is provided with the addition of Option 183. Remote modulation (AM, FM and PM) control is provided by the PM3602 Programmable Modulation Section. Programming instructions are provided in the manuals applicable to these functions.

3-11. Frequency control input connector J5 is a 50 pin remote input connector which mates with AMP "Champ" Plug 229974-1 (not provided). The inputs are TTL compatible, positive logic(1), and each input represents one low-power load (low state sinks 0.8 mA). The frequency format is BCD parallel. Input buffering (storage) is not provided, therefore, all input lines except those for the desired frequency must be held in the low state by the controller.

3-12. Table 3-2 provides pin signal information for connector J5. Table 3-3 provides the same information in functional form. It will be noted that three status flags are made available on J5. These flags are defined in Table 3-3. Table 3-4 includes the programming information for J4 modulation and attenuation input. Additional information for this programming is located in the manual for PM3602.

3-13. To operate in the Remote mode:

a. Connect a source of programming information to frequency control input connector J5 on the RF section rear panel.
b. Set CONTROL switch to REMOTE.

(1)A logical "1" or true input is 2.4 to 5.0 volts.
A logical "0" or false input is 0 to 0.8 volts.

TABLE 3-2. CONNECTOR J5 PIN LAYOUT*

Signal	Pin		Pin	Signal
Logic Ground	50		25	Logic Ground
100 Hz-8	49		24	Not Used
100 Hz-2	48		23	100 Hz-1
10 MHz-8	47		22	100 Hz-4
10 MHz-1	46		21	10 MHz-4
100 MHz-1	45		20	10 MHz-2
10 Hz-2	44		19	10 Hz-1
10 Hz-4	43		18	10 Hz-8
1 MHz-8	42		17	100 MHz-2
1 MHz-4	41		16	100 MHz-4
1 MHz-1	40		15	100 MHz-8
1 MHz-2	39		14	Not Used
Not Used	38		13	1 GHz-1
Power ON-OFF Flag	37		12	**Local/Remote
1.0 Hz-1	36		11	1.0 Hz-2
1.0 Hz-4	35		10	1.0 Hz-8
100 kHz-1	34		9	100 kHz-8
100 kHz-2	33		8	100 kHz-4
0.1 Hz-1	32		7	0.1 Hz-2
0.1 Hz-4	31		6	0.1 Hz-8
Not Used	30		5	10 kHz-8
1 kHz-8	29		4	10 kHz-4
1 kHz-4	28		3	10 kHz-1
1 kHz-1	27		2	10 kHz-2
1 kHz-2	26		1	Out of Range

*MATING CONNECTOR, AMP CHAMP 229974-1
**LOCAL = 0, REMOTE = 1

NOTE

Remote control of level is available only with Option 183, remote control of modulation is available only with the PM3602 Modulation Section. Logic control for these modes are through the J4 connector.

TABLE 3-3. CONNECTOR J5 FUNCTIONAL LAYOUT

Function			Pin
Frequency Decade	0.1 Hz	-1	32
		-2	7
		-4	31
		-8	6
	1 Hz	-1	36
		-2	11
		-4	35
		-8	10
	10 Hz	-1	19
		-2	44
		-4	43
		-8	18
	100 Hz	-1	23
		-2	48
		-4	22
		-8	49
	1 kHz	-1	27
		-2	26
		-4	28
		-8	29
	10 kHz	-1	3
		-2	2
		-4	4
		-8	5
	100 kHz	-1	34
		-2	33
		-4	8
		-8	9
	1 MHz	-1	40
		-2	39
		-4	41
		-8	42

TABLE 3-3. CONNECTOR J5 FUNCTIONAL LAYOUT (Cont)

Function			Pin
Frequency Decade	10 MHz	-1	46
		-2	20
		-4	21
		-8	47
	100 MHz	-1	45
		-2	17
		-4	16
		-8	15
	1 GHz	-1	13
Logic Ground			25, 50
Power ON-OFF Flag (HI-ON, LO-OFF)			37
Remote/Local Flag (HI-Remote, LO-Local)			12
Out-of-Range Flag* (HI-In Band LO-Out of Band)			1

*Indicates that a frequency beyond the range of the plug-in has been asked for.

NOTE

Load at each input equals one low power TTL load (low state sinks 0.8 mA), Positive logic.

3-14. OPERATORS MAINTENANCE

3-15. To check the frequency synthesizer operation, perform the following checks:

a. If both the STDBY and ON indicators are inoperative (no AC power), check that the primary power source is turned on.

b. Check that power cable is securely connected to the unit.

c. Check fuses at rear of unit and replace blown fuses. If fuses constantly blow, the unit requires more extensive repair. (Refer to Section 4.)

d. If AC line power is applied but no output is available, check that the RF section is properly seated and locked in place.

e. Make certain the selected frequency is within the range of the RF section (OUT OF RANGE light is out). (360 ONLY).

f. Check that an appropriate internal or external reference source is connected to the mainframe 5-10 MHz REF IN connector.

g. Check that the output cable being used is not damaged or incorrectly connected. If an output is still not available, the unit requires more extensive repair. (Refer to Section 4.)

TABLE 3-4. J4 REAR PANEL PROGRAMMING INPUT FOR MODULATION AND ATTENUATION FOR PM3602 MODULATOR AND/OR OPTION-183 ATTENUATOR

MATING CONNECTOR, AMP CHAMP 552284-1			
J4 Pin	Signal Name	J4 Pin	Signal Name
-1	MPB-1	-19	Amp 1.0 dBm
-2	MPB-2	-20	Amp 2 dBm
-3	MPB-3	-21	Amp 4 dBm
-4	MPB-4	-22	Amp 8 dBm
-5	MPB-5	-23	Amp 10 dBm
-6	MPB-6	-24	Amp 20 dBm
-7	MPB-7	-25	Amp 40 dBm
-8	MPB-8	-26	Amp 80 dBm
-9	MPB-9	-27	Amp +/-
-10	MPB-10	-28	ATT OPT FLG
-11	MPB-11	-29	ATT GND
-12	MPB-12	-30	
-13	MPB-13	-31	
-14	MPB-14	-32	
-15	Not Used	-33	
-16	MOD OPT FLG	-34	
-17	MOD GND	-35	
-18	Amp 0.5 dBm	-36	

NOTE

Logic inputs are positive true. For further information refer to Appendix A for the 183 Attenuator Option, and the PM3602 manual for the AM/FM/ØM modulation.

SECTION 4

MAINTENANCE

4-1. INTRODUCTION

4-2. This section contains maintenance information for the P3602.0E1 RF Section. The maintenance philosophy presented provides defined troubleshooting procedures to isolate a malfunction to a card or subassembly, then sufficient test data on each card or subassembly is provided to allow troubleshooting to a faulty component. This section contains the principles of operation of the RF plug-in section; a troubleshooting chart to isolate a malfunction to a card or subassembly; photographs of all units; principles of operation of each card and subassembly with schematic diagrams, critical test data, and parts location diagrams. In addition, several critical performance tests and adjustments are provided.

4-3. PRINCIPLES OF OPERATION

4-4. The RF plug-in section (Figure 4-1) provides an output between 1 MHz and 2000 MHz. The output signal is leveled to ±1.0 dB across this range and continuously variable from 0 dBm to +10 dBm (1 to 10 mW). Provision is made for external amplitude modulation for frequencies from DC to 100 kHz.

4-5. The RF plug-in section uses drift cancellation to expand the 30 to 40 MHz frequency range in a similar manner as the frequency extender of the mainframe synthesizer. In this way, fail safe operation is maintained because loss of signal in the RF path results in no output signal rather than an unsynchronized output. All the control logic for the plug-in section as well as the mainframe synthesizer is located in the RF plug-in section. Logic converter A9 provides binary coded decimal (BCD) information for proper oscillator and frequency selection.

4-6. The 10 MHz reference input from the mainframe synthesizer is applied to 10-60 MHz comb generator A1A1 to generate harmonics of 10 MHz up to the sixth harmonic. The BCD outputs from logic converter A9 select the harmonic and the appropriate VHF oscillator covering the 305-395 MHz range in 10 MHz increments. Isolation amplifier A5A2 applies the 305 to 395 MHz signal to mixer A1A2 along with the 10 - 60 MHz harmonics from comb generator A1A1 to produce a signal that is always at 365 MHz. The 365 MHz amplifier filter (A2) amplifies the 365 MHz and removes the 10 MHz sidebands.

4-7. The 30-40 MHz signal from the frequency extender in the mainframe synthesizer is upconverted by mixing with the 365 MHz signal in output converter A2A5 to produce the 395-405 MHz band. Amplifier filter A4 rejects all frequencies except the 395-405 MHz signal and provides an output that is further amplified and multiplied in multiplier assembly A7.

4-8. When frequencies below 60 MHz are selected, the LO band logic signal activates switched buffer amplifier A5A3 providing RF drive from the VHF oscillator to the signal port of output mixer A6A1M1. Switch driver signal DR1 is developed in A6A1 by the LO Band logic signal. For frequencies below 60 MHz, DR1 is set at +2 volts, and for frequencies above 60 MHz, DR1 is at -6 volts. The purpose of DR1 is to turn off drive power to the X10 multiplier A7A2 when operating below 60 MHz.

4-9. The upconverted 30/40 MHz synthesized signal in the 395-405 MHz range is amplified in A7A1 and applied from A7A1J4 to the local oscillator port of output mixer A6A1M1. Since the same VHF oscillator frequency error exists at both mixer ports, the error is cancelled, and the synthesized signal appears at the IF port of the mixer. Table 4-1 lists the VHF oscillator frequencies.

4-10. In the LO Band operation, the VHF oscillator covers the 305 to 395 MHz range in 10 MHz steps. This signal adds the 10 MHz increments to the synthesized signal, producing signals from DC to 59.99. . .MHz at the mixer output.

4-11. The synthesized signal is taken from A6A1J5 and applied to the output section A8, where it is amplified and leveled. Output level control and modulation are also applied to the signal at A8. Level reference board A3 establishes a stable level for the resultant RF output.

4-12. When frequencies above 60 MHz are selected, the LO band logic signal disables A5A3, thereby removing the signal from A6A1M1, turning off this mixer. The HI Band logic signal activates the switched isolator doubler A5A4, which provides frequencies from 610 to 710 MHz, in 20 MHz steps, to the X5 multiplier A7A4. The doubled VHF oscillator signal is first filtered in A6A2 to reduce subharmonics and multiples and amplified in A7A3. Then it is applied to the signal port of mixer assembly A15 through filter A17.

4-13. The DR1 signal is at -6 volts and activates the X10 driver amplifier which multiplies the 395 to 405 MHz signal to the 3950 to 4050 MHz range. This signal contains all the synthesized steps of up to 10 MHz and is applied to the A15 mixer assembly local oscillator port through filters A18 and A19. Error cancellation in this mixer provides synthesized signals at the IF port covering 400 to 999.999. . .MHz, and this signal is applied to A8J1 of the output section A8.

4-14. The A8 output section contains the scaler board A8A1 and output amplifier board A8A2. The scaler board scales the 400 to 999.999. . .MHz range into the 60 to 399.99. . .MHz range, and also contains a broadband doubler, which doubles the 500 to 999.999. .MHz range to the 1000 to 1999.99. . .MHz band. Table 4-1 lists the operating bands. Each band is filtered to attenuate harmonics, and switched into an output amplifier.

4-15. The synthesized output at A8J3 connects to the front panel RF connector in the standard version, however, when the 183 option is installed, the output is passed through a programmable attenuator.

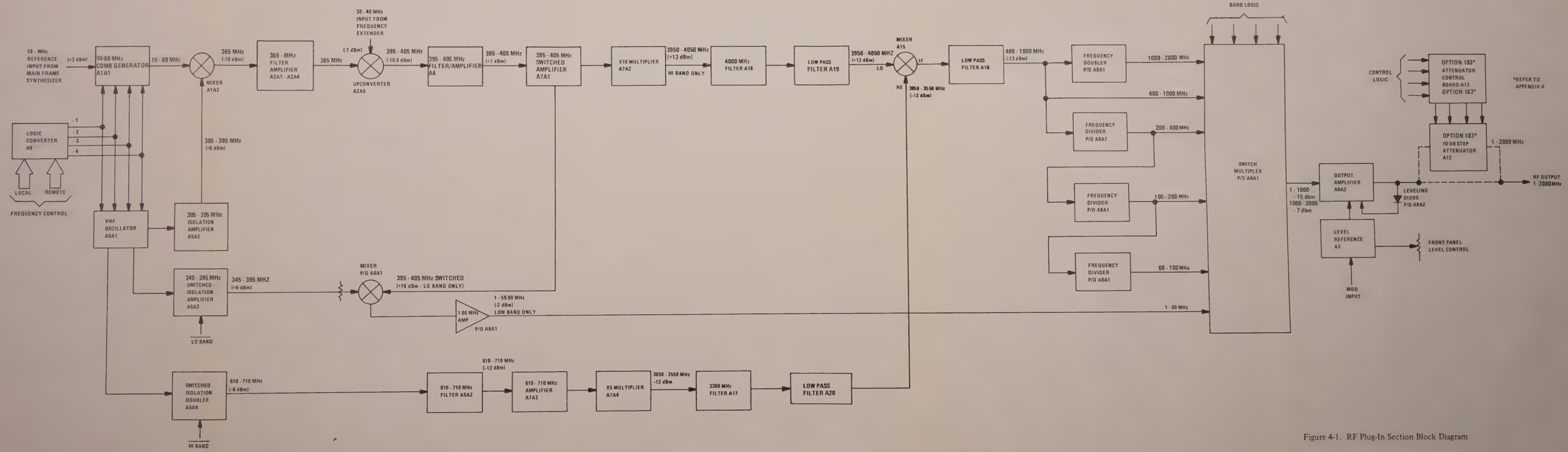

10 - MHz REFERENCE INPUT FROM MAIN FRAME SYNTHESIZER
(+3 dBm)
10-60 MHz COMB GENERATOR A1A1
10 - 60 MHz
MIXER A1A2
365 MHz (-18 dBm)
365 - MHz FILTER AMPLIFIER A2A1 - A2A4
365 MHz
30 - 40 MHz INPUT FROM FREQUENCY EXTENDER
(-1 dBm)
UPCONVERTER A2A5
395 - 405 MHz (-16.5 dBm)
395 - 405 MHz FILTER/AMPLIFIER A4
395 - 405 MHz (+1 dBm)
395 - 405 MHz SWITCHED AMPLIFIER A7A1
X10 MULTIPLIER A7A2
3950 - 4050 MHz (+13 dBm)
HI BAND ONLY
4000 MHz FILTER A18
LOW PASS FILTER A19
3950 - 4050 MHZ (+12 dBm)
LO
MIXER A15
RF
LF
3950 - 3550 MHz (-12 dBm)
LOW PASS FILTER A16
400 - 1000 MHz (-23 dBm)
FREQUENCY DOUBLER P/O A8A1
1000 - 2000 MHz
400 - 1000 MHz
FREQUENCY DIVIDER P/O A8A1
200 - 400 MHz
100 - 200 MHz
60 - 100 MHz
1 - 60 MHz
BAND LOGIC
SWITCH MULTIPLEX P/O A8A1
1 - 1000 - 15 dbm 1000 - 2000 - 7 dbm
OUTPUT AMPLIFIER A8A2
LEVELING DIODE P/O A8A2
LEVEL REFERENCE A3
MOD INPUT
FRONT PANEL LEVEL CONTROL
CONTROL LOGIC
OPTION 183* ATTENUATOR CONTROL BOARD A13 OPTION 183*
*REFER TO APPENDIX A
OPTION 183* 10 DB STEP ATTENUATOR A12
1 - 2000 MHz
RF OUTPUT 1 - 2000 MHz
LOGIC CONVERTER A9
-1
-2
-3
-4
LOCAL
REMOTE
FREQUENCY CONTROL
305 - 395 MHz (+6 dBm)
VHF OSCILLATOR A5A1
305 - 395 MHz ISOLATION AMPLIFIER A5A2
345 - 395 MHz SWITCHED ISOLATION AMPLIFIER A5A3
345 - 395 MHZ (+6 dBm)
LO BAND
MIXER P/O A6A1
395 - 405 MHz SWITCHED (+16 dBm - LO BAND ONLY)
1 - 59.99 MHz (-2 dBm) LOW BAND ONLY
1-60 MHz AMP
P/O A6A1
SWITCHED ISOLATION DOUBLER A5A4
610 - 710 MHz (-6 dBm)
HI BAND
610 - 710 MHz FILTER A6A2
610 - 710 MHz (-12 dBm)
610 - 710 MHz AMPLIFIER A7A3
X5 MULTIPLIER A7A4
3050 - 3550 MHz -12 dBm
3300 MHz FILTER A17
LOW PASS FILTER A20

Figure 4-1. RF Plug-In Section Block Diagram

TABLE 4-1. INTERNAL FREQUENCIES AND CONTROL SIGNALS VERSUS OUTPUT FREQUENCY

Band	Output Frequency MHz	DET Control A	Band Code A8 FL5	FL4	FL3	$\overline{HI}$ Band	$\overline{LO}$ Band	10 MHz Control A9 U20 Pinouts 9 7 10 11 A5 FL6	FL5	FL4	FL3	$\overline{Band}$ 6A	A5 VHF Osc Freq	A1 Comb Gen Freq
1	1.00– 9.999...	0	0	0	1	1	0	0	0	0	0	1	395 MHz	30 MHz
	10.00– 19.999...	1	0	0	1	1	0	0	0	0	1	1	385	20
	20.00– 29.999...	1	0	0	1	1	0	0	0	1	0	1	375	10
	30.00– 39.999...	1	0	0	1	1	0	0	0	1	1	1	365	DC
	40.00– 49.999...	1	0	0	1	1	0	0	1	0	0	1	355	10
	50.00– 59.999...	1	0	0	1	1	0	0	1	0	1	1	345	20
2	60.00– 62.499...	1	0	1	0	0	1	0	1	0	0	1	355	10
	62.50– 74.999...	1	0	1	0	0	1	0	1	0	1	1	345	20
	75.00– 87.499...	1	0	1	0	0	1	0	1	1	0	1	335	30
	87.50– 99.999...	1	0	1	0	0	1	0	1	1	1	1	325	40
3	100.00– 124.999...	1	0	1	1	0	1	0	1	0	0	1	355	10
	125.00– 149.999...	1	0	1	1	0	1	0	1	0	1	1	345	20
	150.00– 174.999...	1	0	1	1	0	1	0	1	1	0	1	335	30
	175.00– 199.999...	1	0	1	1	0	1	0	1	1	1	1	325	40
4	200.00– 249.999...	1	1	0	0	0	1	0	1	0	0	1	355	10
	250.00– 299.999...	1	1	0	0	0	1	0	1	0	1	1	345	20
	300.00– 349.999...	1	1	0	0	0	1	0	1	1	0	1	335	30
	350.00– 399.999...	1	1	0	0	0	1	0	1	1	1	1	325	40
5	400.00– 499.999...	1	1	0	1	0	1	0	1	0	0	1	355	10
	500.00– 599.999...	1	1	0	1	0	1	0	1	0	1	1	345	20
	600.00– 699.999...	1	1	0	1	0	1	0	1	1	0	1	335	30
	700.00– 799.999...	1	1	0	1	0	1	0	1	1	1	1	325	40
	800.00– 899.999...	1	1	0	1	0	1	1	0	0	0	1	315	50
	900.00– 999.999...	1	1	0	1	0	1	1	0	0	1	1	305	60
6	1000.00–1199.999...	1	1	1	0	0	1	0	1	0	1	1	345	20
	1200.00–1399.999...	1	1	1	0	0	1	0	1	1	0	1	335	30
	1400.00–1599.999...	1	1	1	0	0	1	0	1	1	1	0	325	40
	1600.00–1799.999...	1	1	1	0	0	1	1	0	0	0	0	315	50
	1800.00–1999.999...	1	1	1	0	0	1	1	0	0	1	0	305	60

'0' ≤ 0.8V '1' ≥ 2.4V

4-16. TROUBLESHOOTING

4-17. Figure 4-2 is a diagnostic troubleshooting chart for the RF plug-in section. Through the use of the chart, the servicing block diagram (Figure 4-3), and Table 4-1 which summarizes all internal frequencies and control signals, a malfunction can be isolated to a board or subassembly. Figure 4-4 shows the location of all boards and subassemblies in the unit. Table 4-2 is a wire list for the main-frame interface P1 and P2. To further isolate a malfunction to a defective component on a board or subassembly, refer to the applicable paragraph on repair of the board or subassembly.

4-18. REPAIR

4-19. The following paragraphs provide repair data for each board and subassembly of the RF plug-in section. The data is presented in the form of functional descriptions with significant circuit parameters, schematic diagrams, and parts location diagrams. With this data, it is possible to isolate a malfunction to a component on a board or subassembly. The board or subassembly may be either in the unit or on a bench using simulated input signals.

4-20. Repair data for each printed circuit board can be found on the servicing block diagram (Figure 4-3), the referenced schematic diagrams, and in the functional descriptions. To facilitate identification of parts, component location diagrams are included for each printed circuit card. A description of each component is given in Section 5 Replaceable Parts List.

4-21 10-60 MHz COMB GENERATOR A1. The 10-60 MHz comb generator (Figure 4-5) combines the output of VHF oscillator A5 with selected harmonics of 10 MHz to produce a fixed frequency that is always 365 MHz.

4-22 10-60 MHz Comb Generator Board A1A1. Printed circuit board A1A1 (Figure 4-6) generates dc, 10, 20, 30, 40, 50 or 60 MHz. The appropriate frequencies are selected from the 10 MHz control logic generated in the logic converter A9. The BCD frequency control logic is converted to the VHF 10 MHz control logic. Table 4-1 lists the logic codes, the comb generator output frequency, and VHF oscillator A5 output frequency. The combination of comb frequency and oscillator frequency always produces 365 MHz.

4-23. The VHF 10 MHz control logic enters the comb generator through filters FL3 to FL6 and is converted to decimal logic by BCD-to-decimal converter U1. The decimal logic is applied to AND gates U2 and U3 and switch drivers Q7 through Q12. When the 100 MHz and 10 MHz digits 03, 08, 16, and 32 are selected, a dc output is required from the comb generator as shown in Table 4-1. The VHF 10 MHz-1 and VHF 10 MHz-2 control lines are at 0 levels. BCD-to-decimal converter U1

GENERAL

This diagnostic procedure is designed to trace a fault to the module level. Further troubleshooting requires an understanding of the operation of each module, as described Section 4 of this manual. This procedure assumes the malfunction has been traced to the RF Plug-In. This can be verified by checking the status of the two RF signals sent to the plug-in from the mainframe. They are:

1. 30-40 MHz synthesized signal from the frequency extender at A10J5 (Mainframe).
2. The 10 MHz reference signal from the fixed frequency generator at, A5J2 (RF section).

Consult the mainframe manual for the procedure.

1. Plug-in removal
   Remove plug-in from mainframe and connect to mainframe with extender cable 299822. For 380, two MPU extender cables are required in order to connect the plug-in to the mainframe:
   296551-1
   296551-2
   Check +5.2V and -12V supplies on Power Distribution Board A11A1, A2, A3 TP1 and TP2. They should be within ±0.150 Volts.

2. A5 UHF oscillator check
   Connect frequency counter to A5J1. Measure frequencies as described in paragraph 4-89 and readjust where necessary. If oscillators do not turn on in required manner, check logic inputs A5FL3 to FL6. Refer to Table 4-1 for the logic coding. Any malfunction in the control logic should be traced through the logic wiring to the A9 logic converter. Refer to paragraph 4-74 and schematic diagram Figure 4-41.

3. RF signal tracing
   A. 30-40 MHz Input Verification
      Calibrate a power level of -10 dBm on a 757 Spectrum Analyzer and measure the 30-40 MHz synthesized signal from the mainframe on the cable connected to A2 J3. Refer to the servicing block diagram Figure 4-3 for proper power levels. Assuming this signal is present in the mainframe at A10J5, a malfunction at A2P3 indicates a failure in the wiring or mainframe/plug-in interface connector. Refer to wire list Table 4-2.

3. RF signal tracing (Continued)

   B. A1 and A2
      Connect the power calibrated 757 Spectrum Analyzer to A2J2. Two signals should be visible spaced 30 to 40 MHz above and below a third signal at 365 MHz. The upper side band is of interest, 395 to 405 MHz. Exercise the synthesizer between 30.00 and 39.90 MHz and check level. Low power levels, or erratic operation can be traced to the A1 comb generator or A2 filter amplifier. Verify the 10 MHz input to the comb generator at A1J3, and the 365 MHz output at A1J2. If output is erratic, check the logic inputs on A1 FL3, FL4, FL5 and FL6. These follow the same coding as the A5 oscillator as shown in Table 4-1. If A1 checks out, problem is A2. Repair or realign as described in paragraph 4-92.

   C. A4
      Connect the power calibrated 757 Spectrum Analyzer to A4J2. Exercise the frequency range from 30 to 39 MHz and measure the signal level. If incorrect, check input on cable connected to A4J1. If malfunction is in A4, repair or realign as described in paragraph 4-93.

   D. A7, LO BAND Testing (1-59.999 . . . MHz)
      Connect the calibrated 757 to A7J4. A 395-405 MHz signal should be present for any programmed frequency below 60 MHz, at the power level shown on the block diagram. Above 60 MHz, the signal should be attenuated by at least 20 dB. Check switch drive signal DR1 at A7FL3. It should be +2 volts for frequencies below 60 MHz, and -6 volts for frequencies 60 MHz and above. Refer to paragraph 4-50.

   E. A5 and A6 LO Band Testing
      Connect calibrated 757 to A6J5. Exercise synthesizer from 1-50 MHz and verify frequency and level. A malfunction at this time point indicates a failure in A5A3 or A6A1. Test for signal frequency and level at A6J2. Check LO Band logic signal at A5FL7 per Table 4-1.

   F. HI Band Testing (60-1999.999 . . . MHz)
      Using the calibrated 757, check power level and approximate frequency of synthesized signal at output port of A15 mixer, by exercising frequency range between 400 and 990 MHz. A malfunction at this point should be traced through the LO chain including the A7A2 multiplier and filters, and the signal chain starting at A5J3, A6J1, A7J2, the A17 filter, to the mixer signal port. Refer to paragraph 4-94 for alignment and repair of A6A2, and paragraph 4-95 for the A7 multiplier section.

3. RF signal tracing (Continued)
   G. A8 Output Section
      If the synthesized inputs at A8J1 and J2 are correct, check band code logic at A8FL3, FL4 and FL5 as shown in Table 4-1. Also check BAND 6A logic at A8FL6 and DET control a logic at A8FL8 as in Table 4-1.

   Connect the calibrated 757 analyzer to A8J4 and measure signal levels and approximate frequency of the A8A1 scaler board output. If the malfunction is in the scaler board, refer to paragraph 4-59 for the circuit description before attempting service.

   If the scaler output at A8J4 is correct, check the output amplifier at A8J3. For output level and amplitude modulation problems refer to paragraph 4-88. For a circuit description of A8A2 refer to paragraph 4-69.

4. Logic Troubleshooting.

   Table 4-1 lists control logic signals in the various frequency ranges, and points of measurements. Table 4-6 lists additional control signals and test locations.

   Refer to paragraph 4-74 for additional information.

Figure 4-2. RF Plug-In Section Diagnostic Troubleshooting Chart

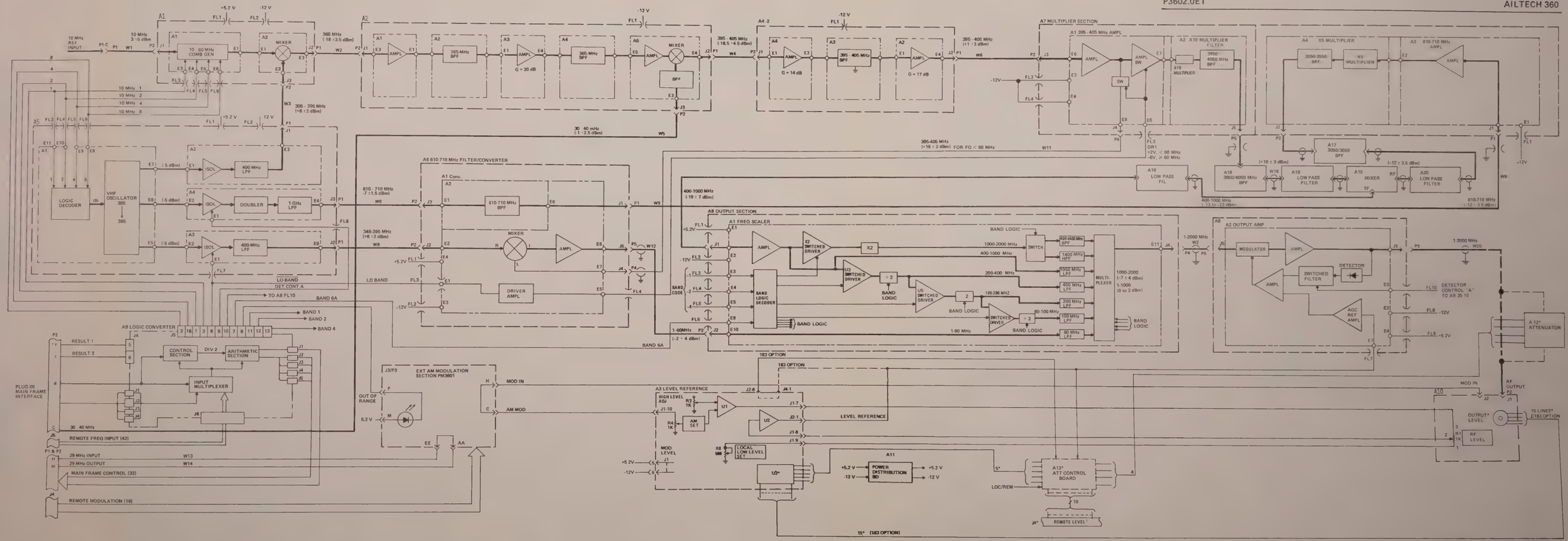
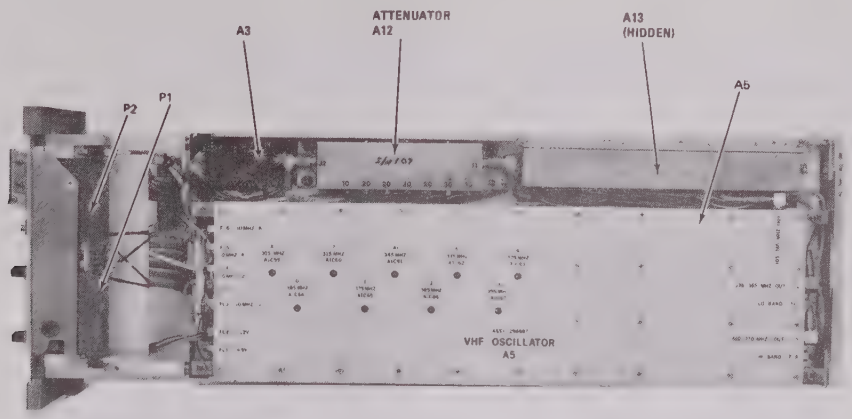
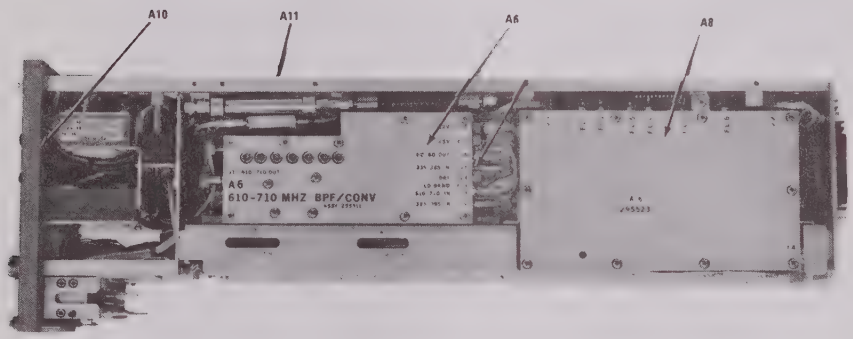


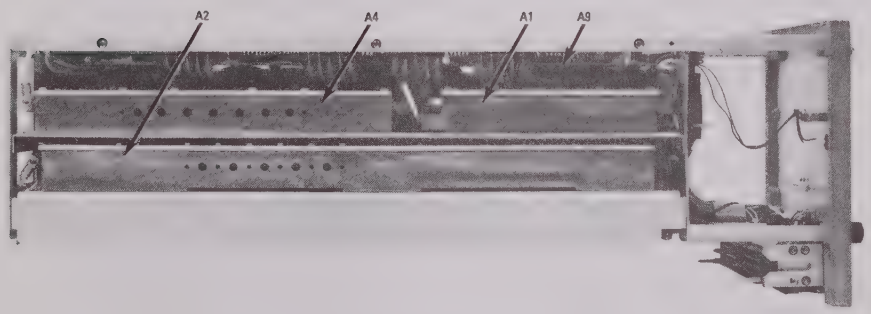
Figure 4-3. RF Plug-In Section Servicing Block Diagram



BOTTOM VIEW



RIGHT SIDE VIEW



LEFT SIDE VIEW

Figure 4-4. RF Plug-In Section Subassembly Locations

TABLE 4-2. PLUG-IN MAINFRAME INTERFACE P1 AND P2 WIRE LIST

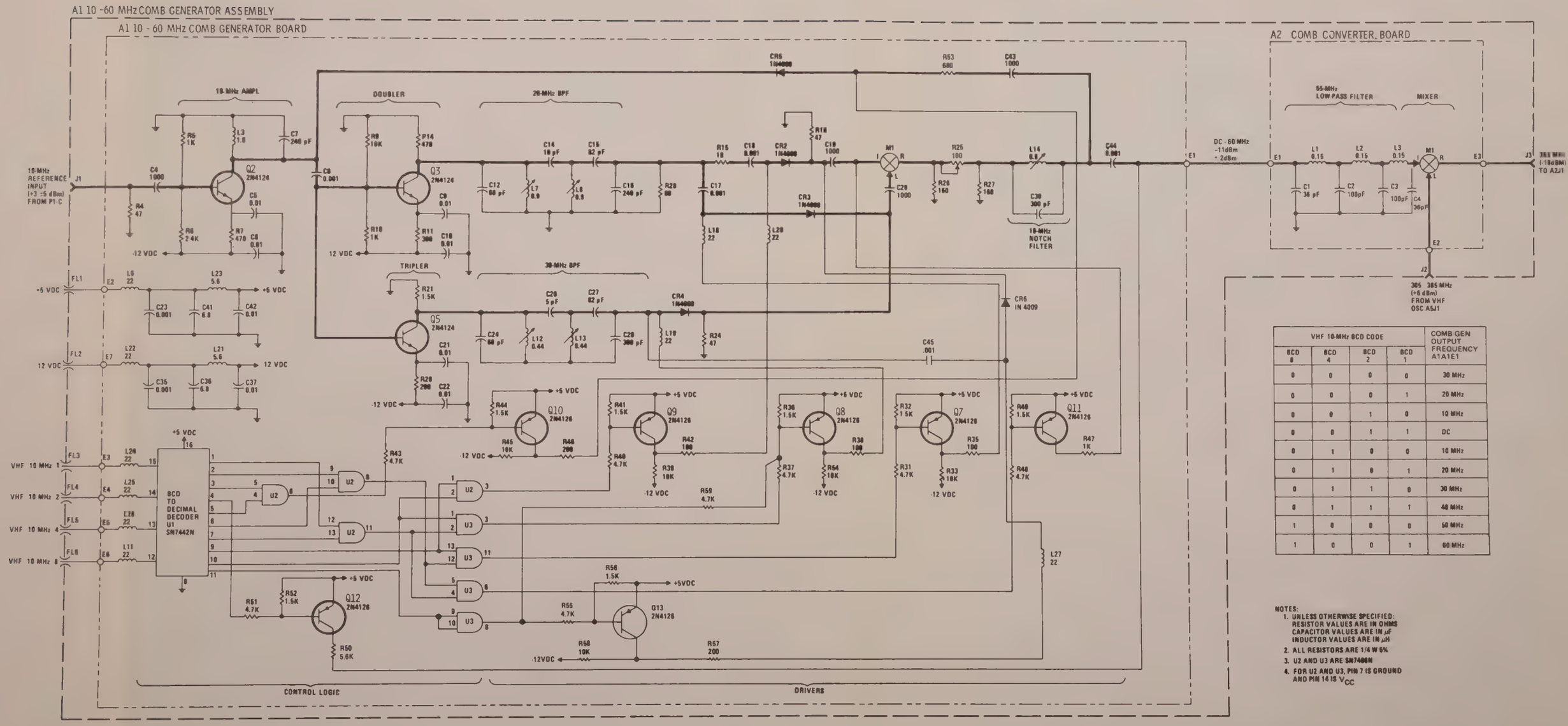
FROM	TO	SIGNAL NAME
P1-A	A9J2-11	BCD 1 kHz-1
P1-B	A9J2-13	Loc 100 kHz-2
P1-C	A1J1	10 MHz (Coax)
P1-D	A9J2-26	Loc 100 kHz-8
P1-E	A9J2-10	BCD 1 kHz-8
P1-F	A9J2-12	Loc 100 kHz-4
P1-H	A9J2-9	BCD 1 kHz-2
P1-J	A9J2-25	Loc 100 kHz-1
P1-K	A9J2-8	BCD 1 kHz-4
P1-L	A9J2-24	Loc 1 MHz-4
P1-M	A9J2-7	BCD 100 Hz-2
P1-N	A9J2-23	Loc 1 MHz-2
P1-P	A9J2-6	BCD 100 Hz-4
P1-R	A9J2-22	Loc 1 MHz-8
P1-S	A9J2-5	BCD 1.0 Hz-1
P1-T	A9J2-21	Loc 1 MHz-1
P1-U	A9J2-4	BCD 1.0 Hz-8
P1-V	A9J2-20	Loc 10 MHz-4
P1-W	A9J2-3	BCD 1.0 Hz-2
P1-X	A9J2-19	Loc 10 MHz-2
P1-Y	A9J2-2	BCD 1.0 Hz-4
P1-Z	A9J2-18	Loc 10 MHz-8
P1-AA	A9J1-15	Loc 100 Hz-4
P1-BB	A9J3-23	FEM 1 MHz-2
P1-DD	A9J3-22	FEM 1 MHz-8
P1-EE	A9J1-14	Loc 100 Hz-2
P1-FF	A9J3-21	FEM 1 MHz-1
P1-HH	A9J1-1	Loc 100 Hz-8
P1-a	A9J1-26	BCD 0.1 Hz-8
P1-b	A9J2-17	Loc 10 MHz-1
P1-c	A9J1-13	BCD 0.1 Hz-4
P1-d	A9J2-16	Loc 1 kHz-4
P1-e	A9J1-12	BCD 10 Hz-1
P1-f	A9J2-15	Loc 1 kHz-2

TABLE 4-2. PLUG-IN MAINFRAME INTERFACE P1 AND P2 WIRE LIST (Cont)

FROM	TO	SIGNAL NAME
P1-h	A9J1-25	BCD 0.1 Hz-2
P1-j	A9J2-1	Loc 1 kHz-1
P1-k	A9J1-11	BCD 10 Hz-8
P1-m	A9J2-14	Log 1 kHz-8
P1-n	A9J1-24	BCD 0.1 Hz-1
P1-p	A9J1-23	Loc 1.0 Hz-4
P1-r	A9J1-10	BCD 10 Hz-4
P1-s	A9J1-22	Loc 1.0 Hz-2
P1-t	A9J1-9	BCD 10 Hz-2
P1-u	A9J1-21	Loc 1.0 Hz-8
P1-v	A9J1-8	BCD 100 Hz-1
P1-w	A9J1-20	Loc 1.0 Hz-1
P1-x	A9J1-7	BCD 100 Hz-8
P1-y	A9J4-7	.05 Hz Loc
P1-z	A9J3-24	FEM 1 MHz-4
P1-CC	A9J1-2	Loc 100 Hz-1
P2-A	E1	Gnd
P2-B	A11J1-1	5.2 VDC
P2-C	A2J3	30-40 MHz (Coax)
P2-D	A9J4-26	5.2 VDC
P2-E	A9J4-25	5.2 VDC
P2-F	A9J1-6	Loc 0.1 Hz-8
P2-H	Mod J3-EE	29 MHz In (Coax)
P2-J	A9 J1-19	Loc 10 Hz-4
P2-K	A9J4-11	BCD 10 kHz-8
P2-L	A9J1-5	Loc 0.1 Hz-4
P2-M	Mod J3-AA	29 MHz Out (Coax)
P2-N	A9J1-18	Loc 10 Hz-8
P2-P	A9J4-24	BCD 10 kHz-1
P2-R	A9J1-4	Loc 0.1 Hz-2
P2-S	A9J4-10	BCD 10 kHz-2
P2-T	A9J1-17	Loc 10 Hz-2
P2-U	A9J4-9	BCD 10 kHz-4

TABLE 4-2. PLUG-IN MAINFRAME INTERFACE P1 AND P2 WIRE LIST (Cont)

FROM	TO	SIGNAL NAME
P2-V	A9J1-3	Loc 0.1 Hz-1
P2-W	Not Used	
P2-X	A9J1-16	Loc 10 Hz-1
P2-Y	A9J4-5	RESLT 2
P2-Z	A9J4-23	Loc 100 MHz-4
P2-AA	A9J3-10	Loc 10 kHz-8
P2-BB	A11J1-4	-12 VOP
P2-CC	A9J3-9	Loc 10 kHz-2
P2-DD	A11J1-6	-12 VOP
P2-EE	A11J1-2	5.2 VDC
P2-FF	A11J1-5	-12 VOP
P2-HH	*Mod J3-S	Loc/Rem
P2-a	Not Used	
P2-b	A9J4-22	Loc 100 MHz-2
P2-c	A9J4-6	RESLT 1
P2-d	A9J4-8	Loc/Rem
P2-e	A9J3-25	BCD 100 kHz-1
P2-f	A9J4-21	Loc 100 MHz-8
P2-h	A9J3-26	BCD 100 kHz-8
P2-j	A9J4-20	Loc 100 MHz-1
P2-k	A9J3-13	BCD 100 kHz-2
P2-m	A9J4-19	Loc 1 GHz-4
P2-n	A9J3-12	BCD 100 kHz-4
P2-p	A9J4-18	Loc 1 GHz-2
P2-r	Not Used	
P2-s	A9J4-17	Loc 1 GHz-8
P2-t	Not Used	ACH-1
P2-u	A9J4-16	Loc 1 GHz-1
P2-v	Not Used	ACN-1
P2-w	A9J3-11	Loc 10 kHz-1
P2-x	Not Used	ACH-2
P2-y	A9J3-8	Loc 10 kHz-4
P2-z	Not Used	ACN-2



VHF 10-MHz BCD CODE				COMB GEN OUTPUT FREQUENCY A1A1E1
BCD 8	BCD 4	BCD 2	BCD 1	
0	0	0	0	30 MHz
0	0	0	1	20 MHz
0	0	1	0	10 MHz
0	0	1	1	DC
0	1	0	0	10 MHz
0	1	0	1	20 MHz
0	1	1	0	30 MHz
0	1	1	1	40 MHz
1	0	0	0	50 MHz
1	0	0	1	60 MHz

NOTES:
1. UNLESS OTHERWISE SPECIFIED: RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN μF INDUCTOR VALUES ARE IN μH
2. ALL RESISTORS ARE 1/4 W 5%
3. U2 AND U3 ARE SN7408N
4. FOR U2 AND U3, PIN 7 IS GROUND AND PIN 14 IS V_{CC}

Figure 4-5. 10-60 MHz Comb Generator A1, Schematic Diagram

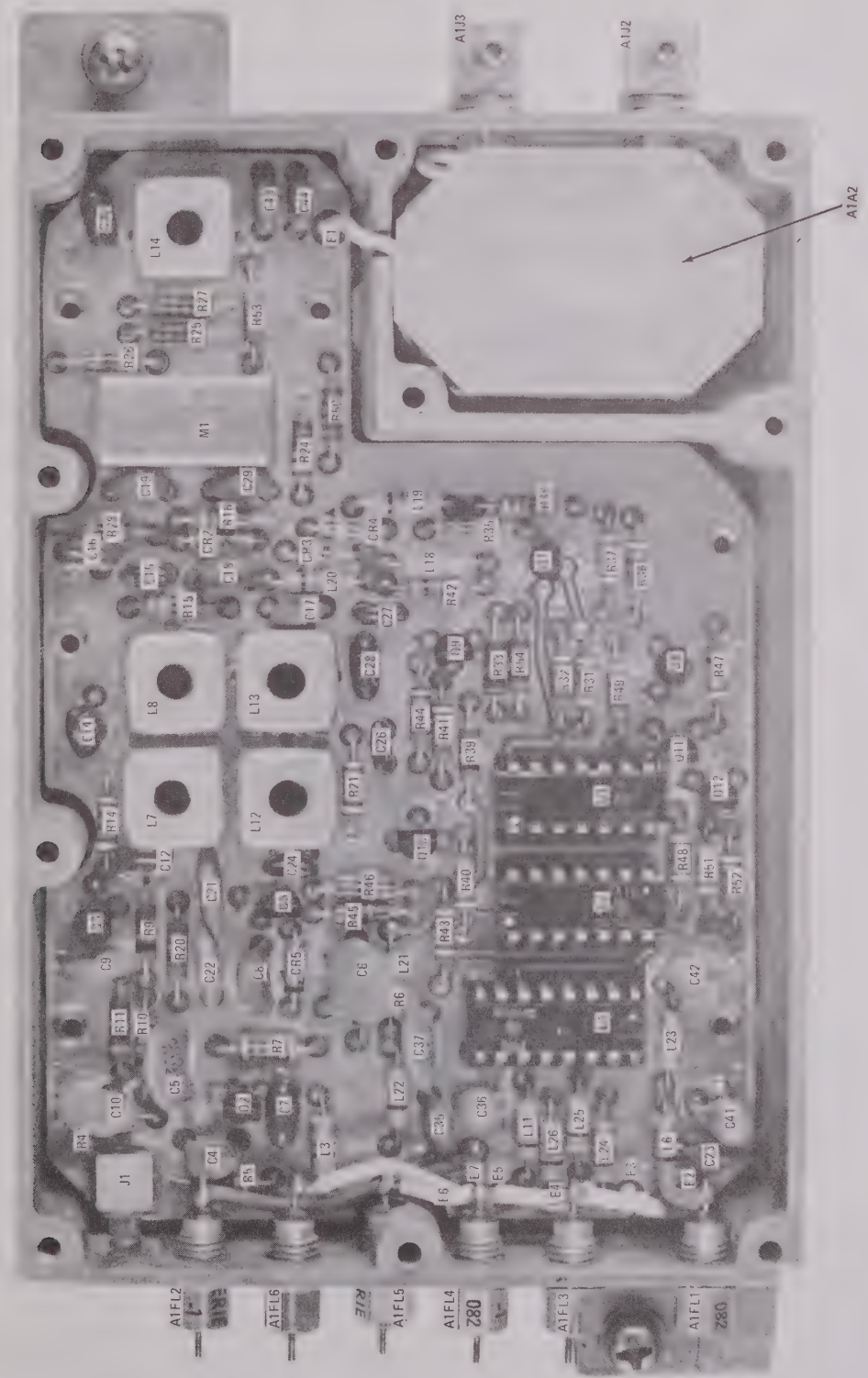


Figure 4-6. 10-60 MHz Comb Generator Board A1A1, Component Locations

converts this BCD code to a decimal 3 and turns on switch Q12. When switch Q12 is on, +5 volts is applied through R50 to output terminal E1 on board A1A1.

4-24. When a 10 MHz output is required from the comb generator (the VHF 10 MHz codes are shown in Table 4-1) a decimal 2 or 4 is generated by U1 and applied to AND gates U2-4 and U2-5. The gate output goes low and turns on driver Q10, which applied +5 volts through R46 to diode CR5. The forward bias turns the diode on enabling the 10 MHz signal at Q2 to pass through R53, C43, and C44 to the board output at terminal E1. When driver Q10 is off, -12 volts is applied to diode CR5 through R45 and R46 providing reverse bias to turn the diode off. The 10 MHz signal at Q2 is thereby attenuated.

4-25. In a similar manner, when 20 MHz is required from the comb generator, drivers Q7 and Q11 are turned on. Driver Q11 provides a DC bias to the I port of mixer M1, which reduces the isolation between ports L and R to a small value. Driver Q7 provides forward bias to diode switch CR3 which then passes the 20 MHz signal from doubler Q3 to the L port of M1. The output of M1 is applied to the board output at terminal E1. The 10 MHz notch filter (L14 and C39) attenuates a residual 10 MHz signal to an acceptable level.

4-26. When 30 MHz is required from the comb generator, drivers Q8 and Q11 are turned on. The I port of mixer M1 if forward biased through Q8 and R38. With CR4 forward biased, the 30 MHz signal from tripler Q5 passes to the L port of M1 to the board output at E1.

4-27. When 40 MHz is required from the comb generator, drivers Q7 and Q9 are turned on providing forward bias to diode switches CR2 and CR3. The 20 MHz signal from doubler Q3 is applied to ports I and L of mixer M1. The resultant mixing action of M1 produces 40 MHz at port R which is applied to the board output at terminal E1.

4-28. When 50 MHz is required from the comb generator, drivers Q8 and Q9 are turned on providing forward bias to diode switches CR2 and CR4. This applies 20 MHz to port I and 30 MHz to port L of mixer M1. The resultant mixing action of M1 produces 50 MHz at port R which is applied to the board output at E1.

4-29. 10-60 MHz Comb Converter Board A1A2. The comb frequency output from board A1A1 is applied to input terminal E1 of board A1A2 (Figure 4-7). The comb frequency is mixed with the VHF oscillator frequencies in mixer A1A2M1 providing the fixed 365 MHz frequency. The low pass filter comprising L1, L2, L3, C1, C2, C3 and C4 attenuates higher harmonics of the comb frequencies.

4-30. 365 MHZ FILTER AMPLIFIER A2. The 365 MHz filter amplifier (Figures 4-8 and 4-9) receives the fixed 365 MHz output frequency and sidebands from comb generator A1 and attenuates the sidebands to a level below 100 dBc. Filtering is accomplished by two 5 section strip line filters separated by a buffer amplifier. The output of the second filter is mixed with the synthesized 30-40 MHz from the frequency extender producing 395 to 405 MHz.

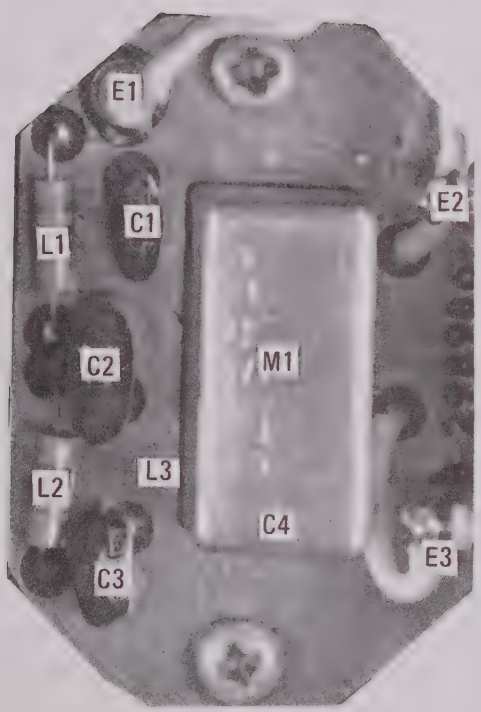


Figure 4-7. Comb Converter Board A1A2, Component Locations

4-31. 365 MHz Input Board A2A1. 365 MHz Input Board A2A1 (Figure 4-10) consists of amplifier stage Q1 tuned to 365 MHz. The board provides 7 dB gain to drive the first filter section.

4-32. 365 MHz Buffer Board A2A3. 365 MHz Buffer Board A2A3 (Figure 4-11) is a buffer amplifier which isolates the two 365 MHz filters and compensates for the filter insertion loss. Two stages of amplification provide 18 dB of gain at the center frequency of 365 MHz.

4-33. 365 MHz Output Converter Board A2A5. Board A2A5 (Figure 4-12) amplifies the 365 MHz output of the filter in three tuned stages Q1, Q2, and Q3. The amplified 365 MHz signal is applied to the L port of mixer M1 and mixed with the 30-40 MHz signal from the frequency extender. The 395-405 MHz signal at the I port is connected to the module output at J2. A 400 MHz low pass filter at the L port and a 30-40 MHz band pass filter at the R port reduce higher order mixing products. The output spurious responses are greater than -100 dBc.

4-34. LEVEL REFERENCE A3. The level reference board (Figure 4-13) is used in conjunction with front panel OUTPUT LEVEL (dBm) control A10R1 to set the level to output amplifier A8. The high level reference voltage (approximately 0.5 volt dc for +10 dBm) is set by R3 from zener reference CR1 and buffered by U1A. The output of U1 is sent to the high end of the front panel control. The low end of the front panel level control is set by R8 which is adjusted for 0 dBm (approximately 0.11 volts). OUTPUT LEVEL control A10R1, therefore, varies from 0 dBm to +10 dBm or approximately 0.11 to 0.5 volts. Resistor R7 shapes this voltage versus control position to obtain an approximate linear variation of dB versus control position. The output is buffered by U1B and applied to the output amplifier. Figure 4-14 shows component locations of level reference board A3. For critical adjustments, refer to paragraph 4-89. U3 is installed as part of the 183 Attenuator Option and is used to encode the amplitude range switch into a binary format. Appendix A to this manual describes the 183 option.

4-35. 395-405 MHz FILTER AMPLIFIER A4. The 395-405 MHz filter amplifier (Figures 4-15 and 4-16) amplifies the 395-405 MHz output from module A2. A seven section stripline filter removes unwanted sidebands generated in the mixer on board A2A5.

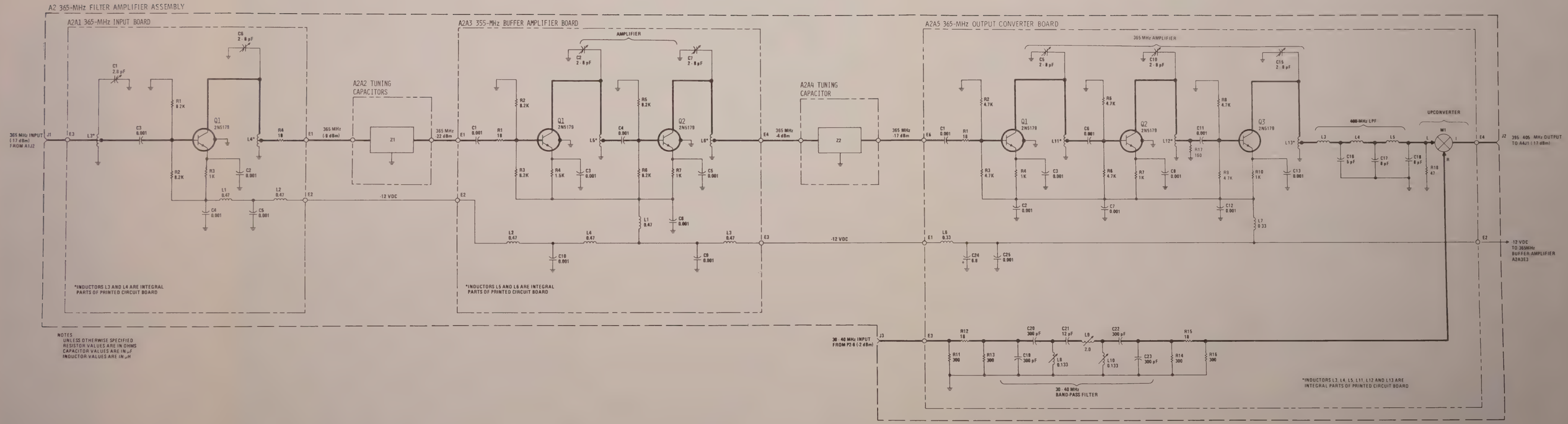

A2 365-MHz FILTER AMPLIFIER ASSEMBLY
A2A1 365-MHz INPUT BOARD
A2A3 355-MHz BUFFER AMPLIFIER BOARD
A2A5 365-MHz OUTPUT CONVERTER BOARD
A2A2 TUNING CAPACITORS
A2A4 TUNING CAPACITOR
AMPLIFIER
365 MHz AMPLIFIER
UPCONVERTER
400-MHz LPF
365 MHz INPUT (17 dBm) FROM A1J2
395-405 MHz OUTPUT TO A4J1 (17 dBm)
365 MHz (9 dBm)
365 MHz 22 dBm
365 MHz -4 dBm
365 MHz 17 dBm
-12 VDC
12 VDC TO 365MHz BUFFER AMPLIFIER A2A3E3
30-40 MHz INPUT FROM P2-6 (-2 dBm)
30-40 MHz BAND-PASS FILTER
2N5179
*INDUCTORS L3 AND L4 ARE INTEGRAL PARTS OF PRINTED CIRCUIT BOARD
*INDUCTORS L5 AND L6 ARE INTEGRAL PARTS OF PRINTED CIRCUIT BOARD
*INDUCTORS L3, L4, L5, L11, L12 AND L13 ARE INTEGRAL PARTS OF PRINTED CIRCUIT BOARD
NOTES
UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
INDUCTOR VALUES ARE IN μH

Figure 4-8. 365 MHz Filter Amplifier A2, Schematic Diagram

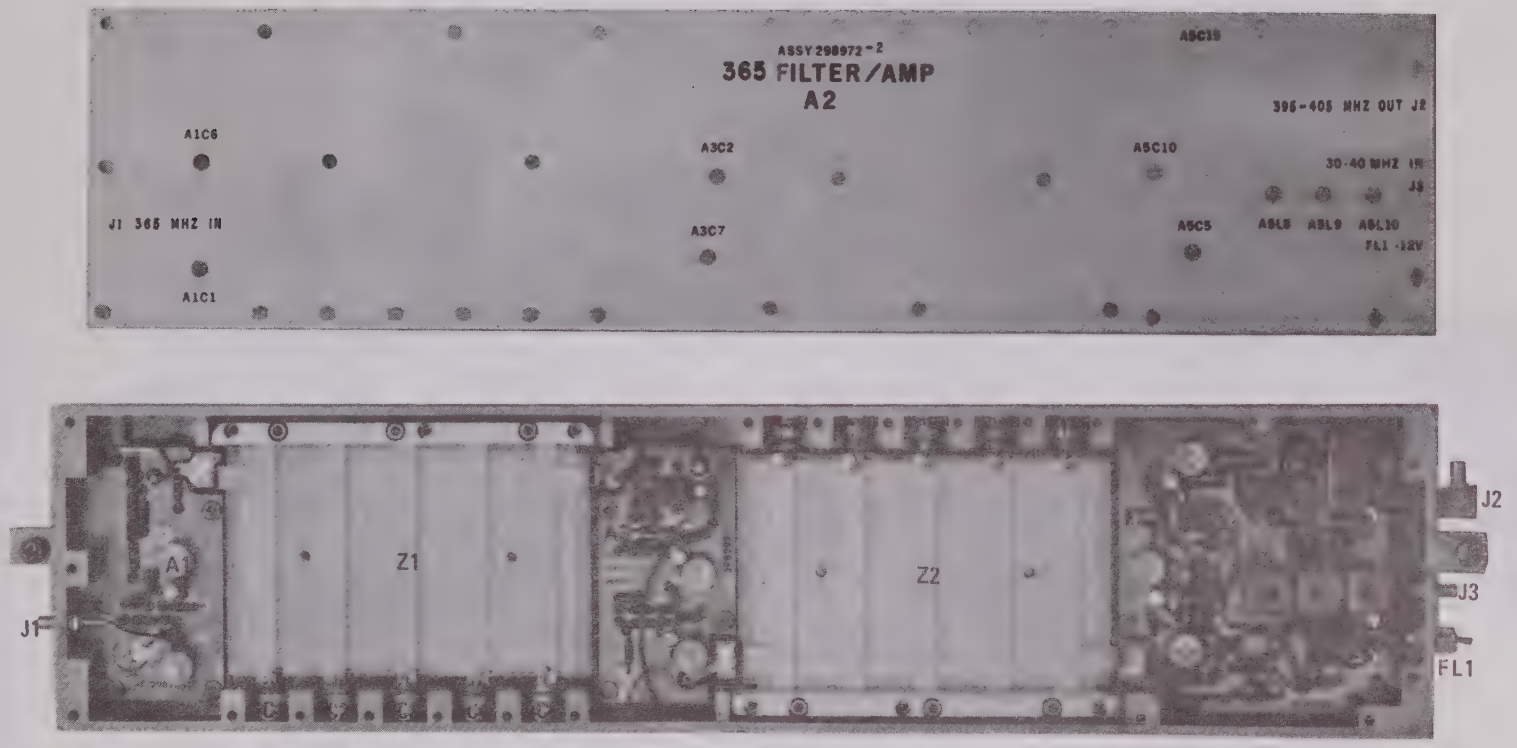


Figure 4-9. 365 MHz Filter Amplifier Assembly A2, Component Locations

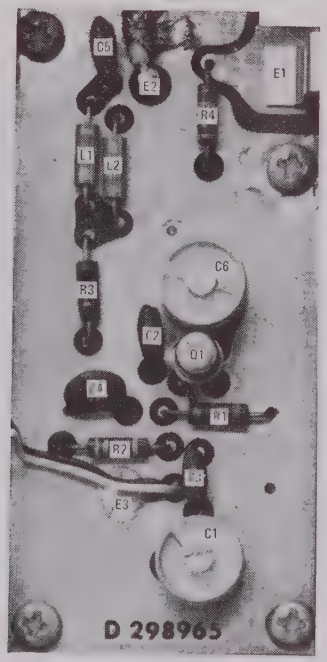


Figure 4-10. 365 MHz Input Board A2Á1, Component Locations

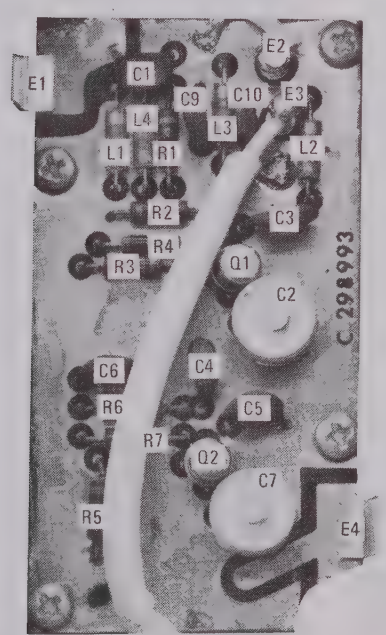


Figure 4-11. 365 MHz Buffer Amplifier Board A2A3, Component Locations

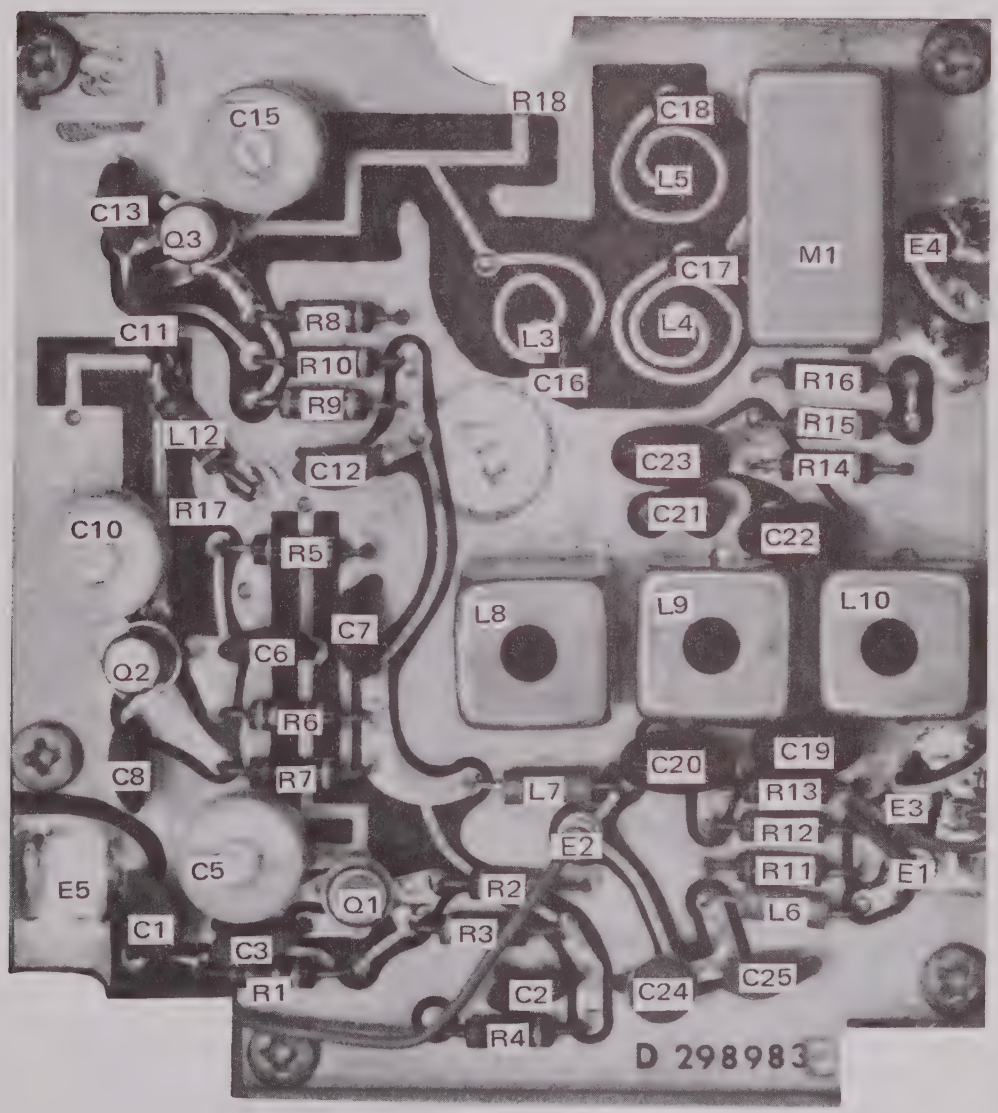


Figure 4-12. 365 MHz Output Converter Board A2A5, Component Locations

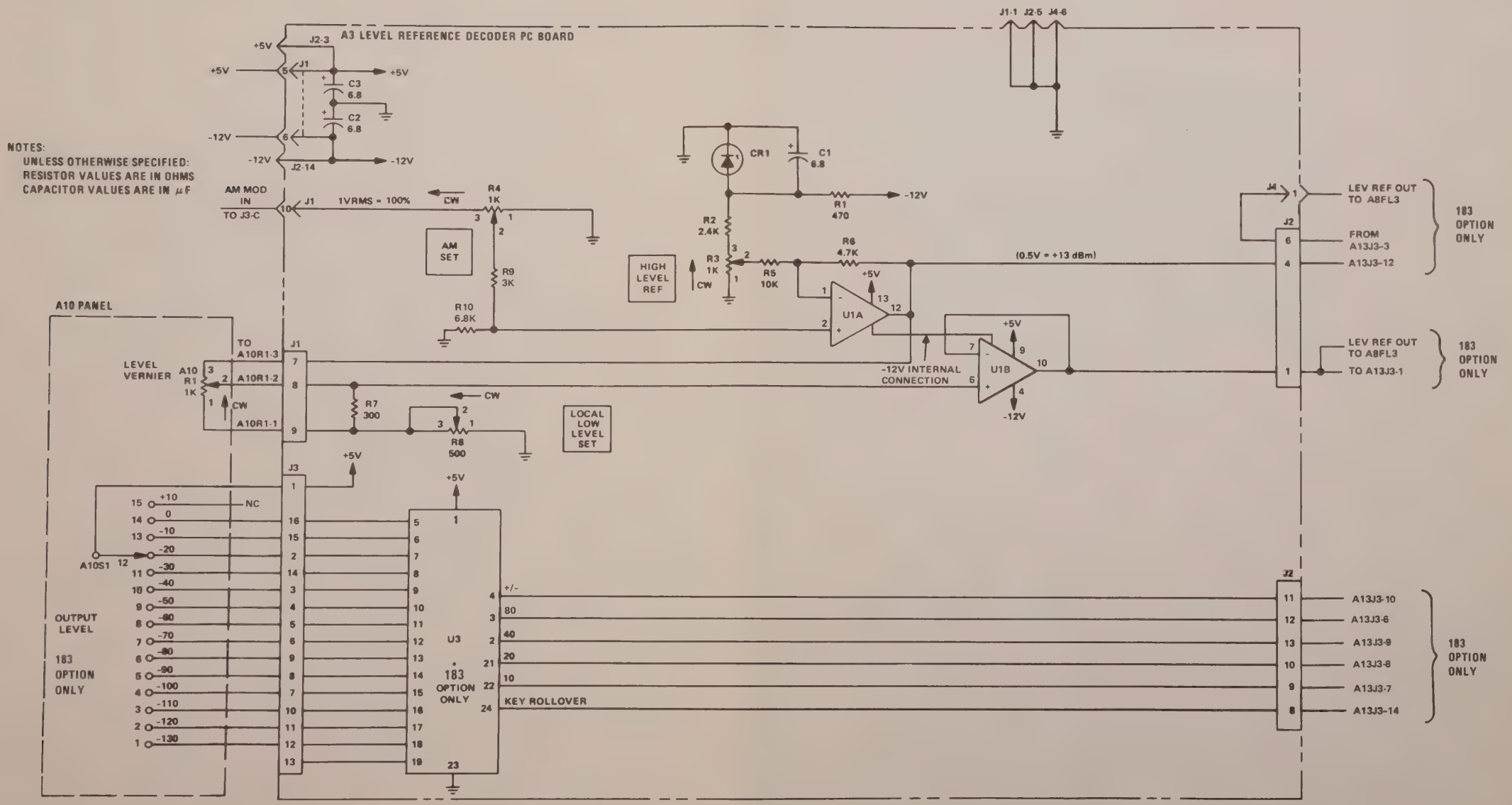


Figure 4-13. Level Reference Assembly A3, Schematic Diagram

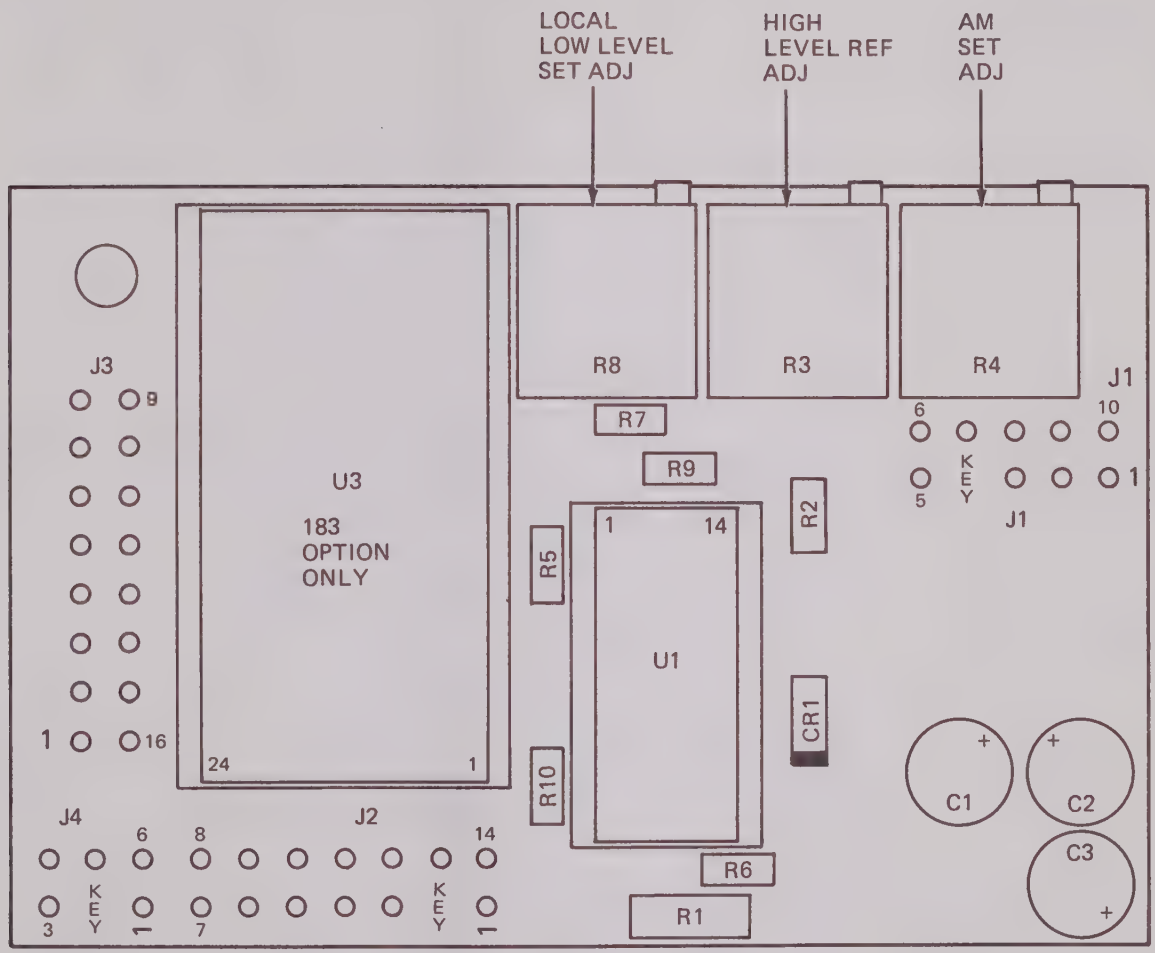


Figure 4-14. Level Reference/Decoder PC Board A3, Component Locations

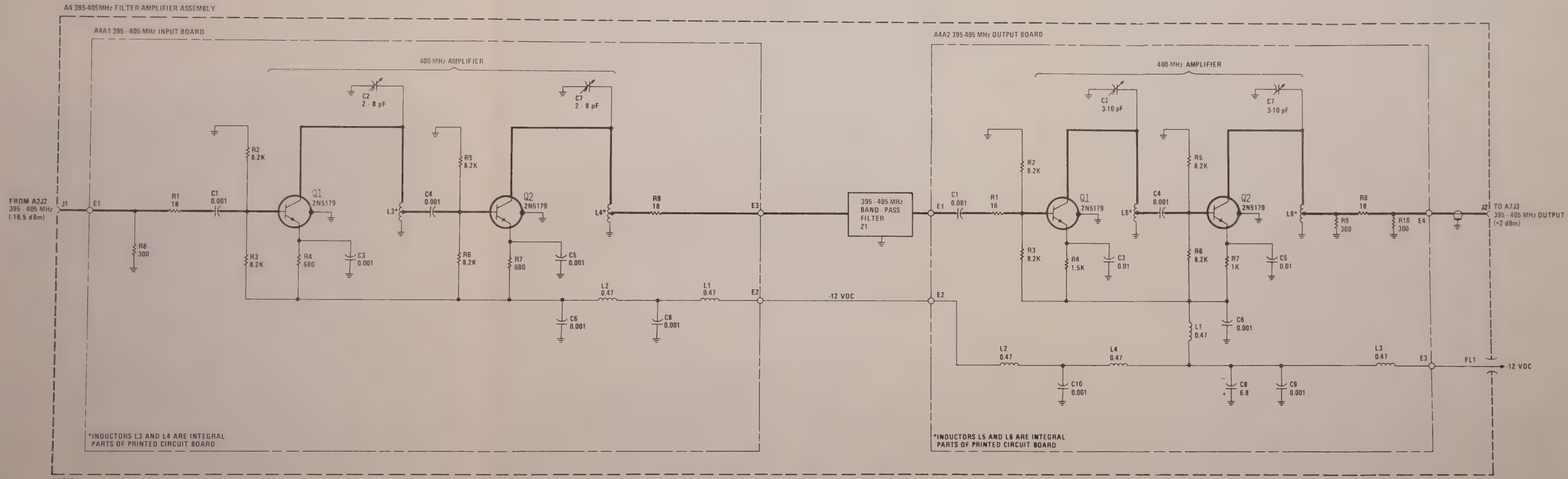


Figure 4-15. 395-405 MHz Filter Amplifier A4, Schematic Diagram

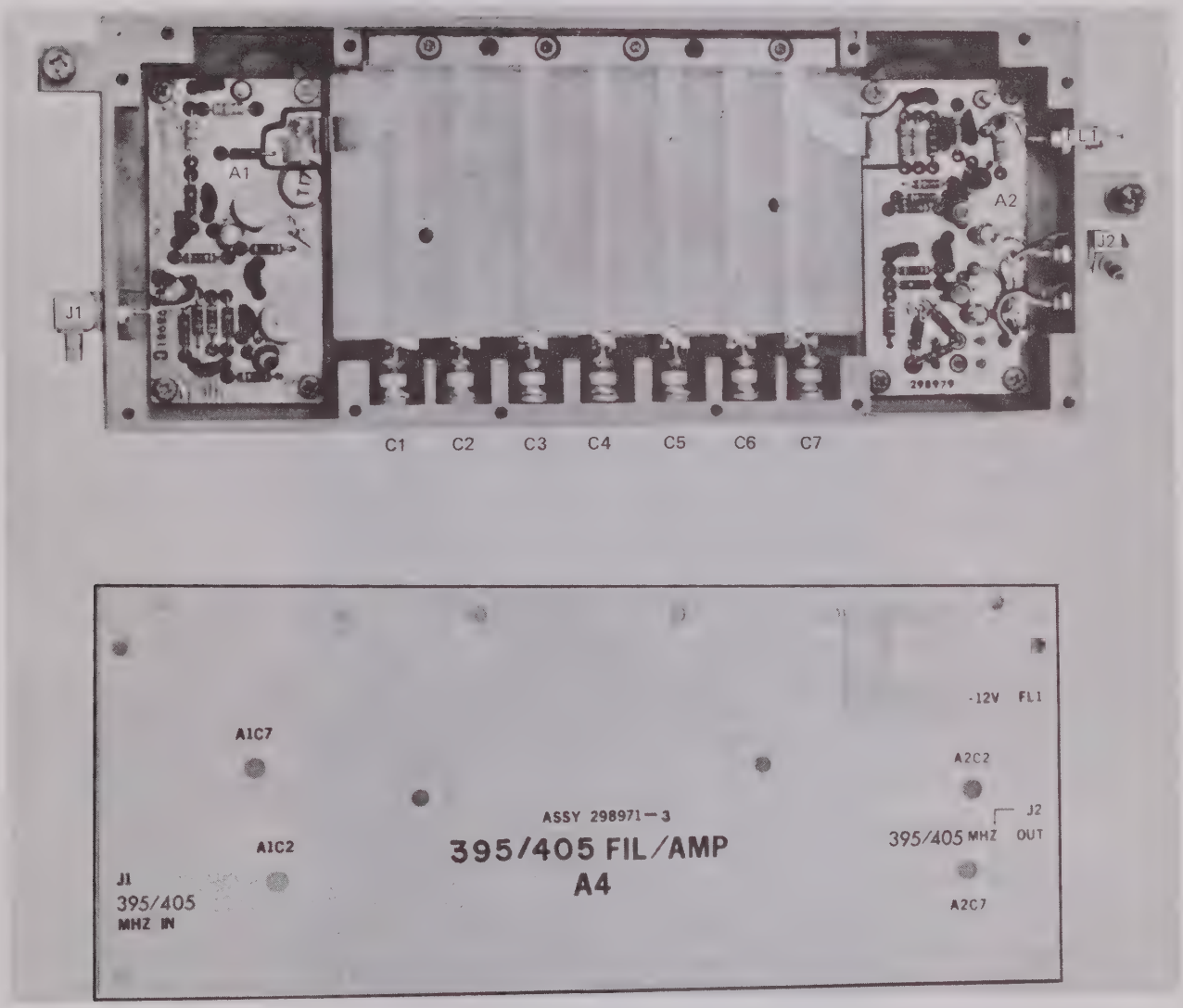


Figure 4-16. 395-405 MHz Filter Amplifier Assembly A4, Component Locations

4-36. 395-405 MHz Input Board A4A1. Board A4A1 (Figure 4-17) contains two amplifier stages and provides 15 dB gain at 395-405 MHz. The output stage drives the 395-405 MHz filter through matching attenuator R9 and R10.

4-37. 395-405 MHz Output Board A4A2. Board A4A2 (Figure 4-18) amplifies the filter output to +3 dBm using two tuned amplifier stages. The two stages provide 14 dB gain. The amplifier provides a nominal output of 0 dBm at J2.

4-38. VHF OSCILLATOR A5. The VHF oscillator (Figures 4-19 and 4-20) contains nine free-running switchable oscillators covering the 305 to 395 MHz range in 10 MHz increments. The module contains four printed circuit boards and provides two isolated fundamental frequency outputs and a frequency doubled output.

4-39. VHF Oscillator Board A5A1. Oscillator board A5A1 (Figure 4-21) contains the ten switched oscillators, a logic converter, and oscillator switches. Microstrip is used for the oscillator tuned circuits to provide stability and shielding. The VHF 10 MHz BCD code from logic converter A9 is converted to decimal code by U1. Table 4-1 lists the 10 MHz BCD code and the required oscillator frequency.

4-40. Each of the ten oscillators is identical and contains oscillator and switching transistors. U1 is a BCD to 10 line decoder which converts the VHF 10 MHz logic. When the lines are high, the PNP switching transistor is off, thereby holding the oscillator transistor off. When a line goes low, the appropriate switching transistor base emitter junction becomes forward biased and the transistor goes on, turning on the oscillator transistor.

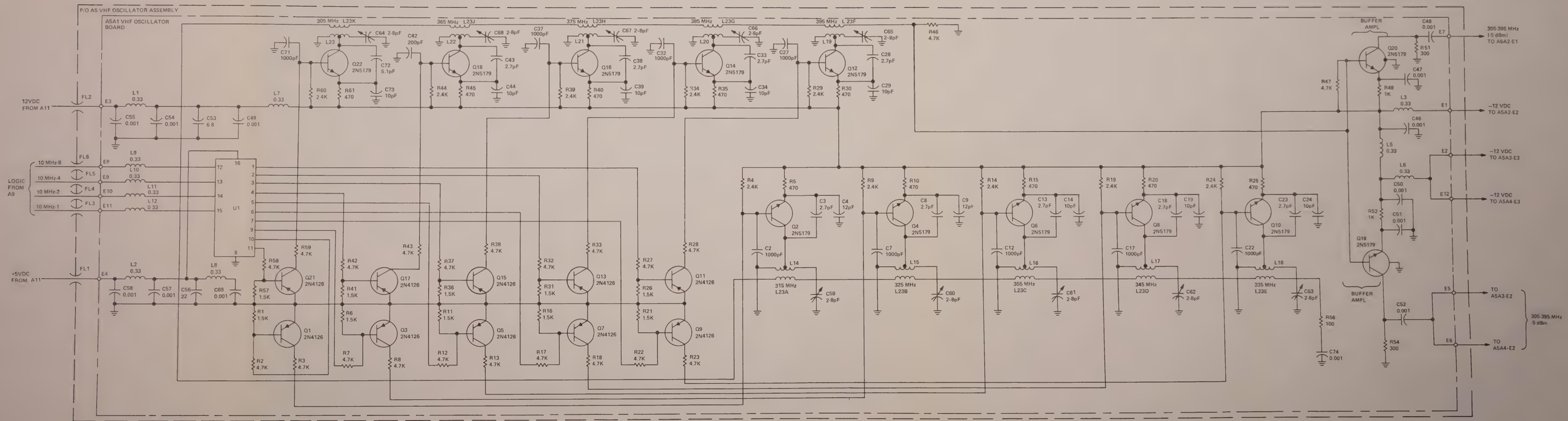
4-41. The oscillator tuning circuits are inductively coupled to a 50 ohm transmission line which drives buffer amplifiers Q19 and Q20. Each oscillator is adjustable to its correct frequency by an associated trimmer capacitor.

4-42. 305-395 MHz Isolation Amplifier A5A2. Isolation/Amplifier board A5A2 (Figure 4-22) consists of a 3 stage tuned amplifier and a 400 MHz low pass filter. The isolator attenuates signals from the comb generator to the other two VHF oscillator outputs. The amplifier has 12 dB gain providing +7 dBm from 305 to 395 MHz.

4-43. 345-395 MHz Switched Isolation Amplifier A5A3. Switched Isolation Amplifier board A5A3 (Figure 4-23) is similar to the A5A2 board, but contains a switching transistor Q4. This board provides 345 to 395 MHz for generation of output frequencies below 60 MHz, and is turned off for frequencies above 60 MHz. When the synthesizer is programmed below 60 MHz, the LO Band logic signal is at a low level and Q4 is turned on. The collector of Q4 connects to base bias resistors

Figure 4-17. 395-405 MHz Input Board A4A1, Component Locations

Figure 4-18. 395-405 MHz Output Board A4A2, Component Locations



NOTES: UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
INDUCTOR VALUES ARE IN μH

Figure 4-19. VHF Oscillator A5, Schematic Diagram (Sheet 1 of 2)

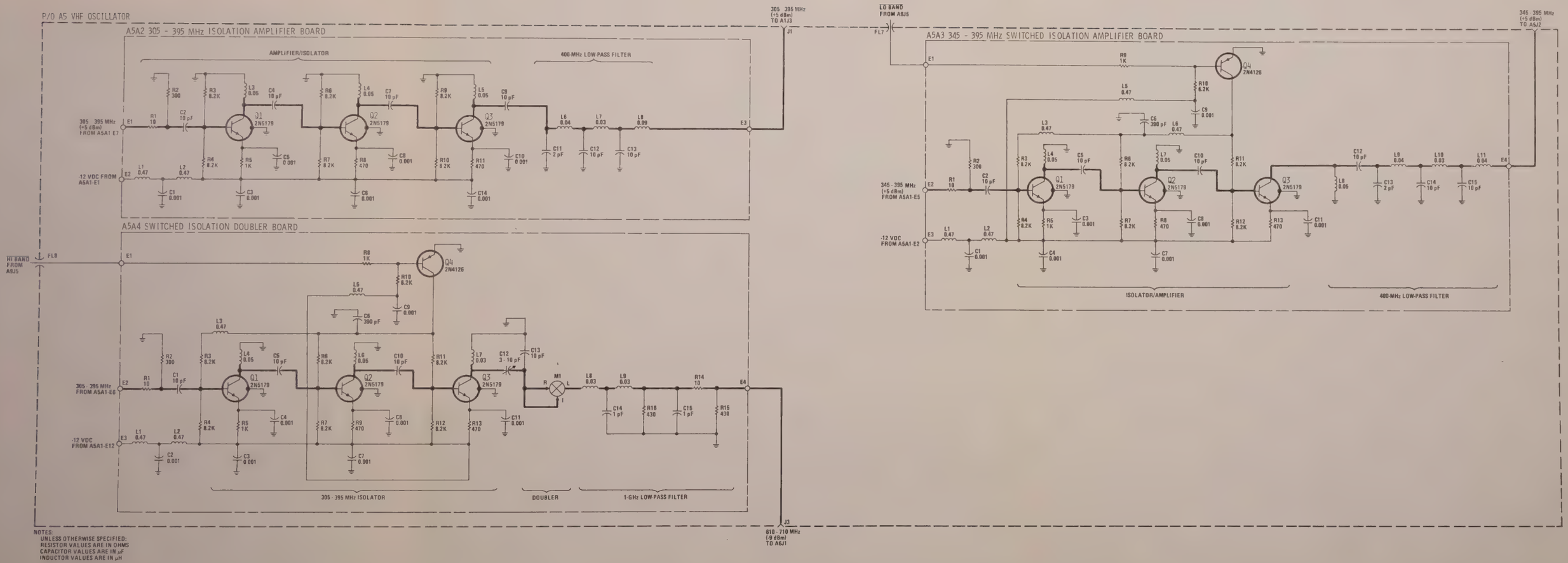

P/O A5 VHF OSCILLATOR
A5A2 305 - 395 MHz ISOLATION AMPLIFIER BOARD
AMPLIFIER/ISOLATOR
400-MHz LOW-PASS FILTER
305 - 395 MHz (+5 dBm) FROM A5A1 E7
-12 VDC FROM A5A1-E1
305 - 395 MHz (+5 dBm) TO A1J3
J1
A5A4 SWITCHED ISOLATION DOUBLER BOARD
HI BAND FROM A9J5
FL9
305 - 395 MHz FROM A5A1-E6
-12 VDC FROM A5A1-E12
305 - 395 MHz ISOLATOR
DOUBLER
1-GHz LOW PASS FILTER
J3
610 - 710 MHz (-9 dBm) TO A6J1
LO BAND FROM A9J5
FL7
A5A3 345 - 395 MHz SWITCHED ISOLATION AMPLIFIER BOARD
345 - 395 MHz (+5 dBm) FROM A5A1-E5
-12 VDC FROM A5A1-E2
ISOLATOR/AMPLIFIER
400-MHz LOW-PASS FILTER
345 - 395 MHz (+5 dBm) TO A5J2
Q1 2N5179
Q2 2N5179
Q3 2N5179
Q4 2N4126
NOTES:
UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
INDUCTOR VALUES ARE IN μH

Figure 4-19. VHF Oscillator A5, Schematic Diagram (Sheet 2 of 2)

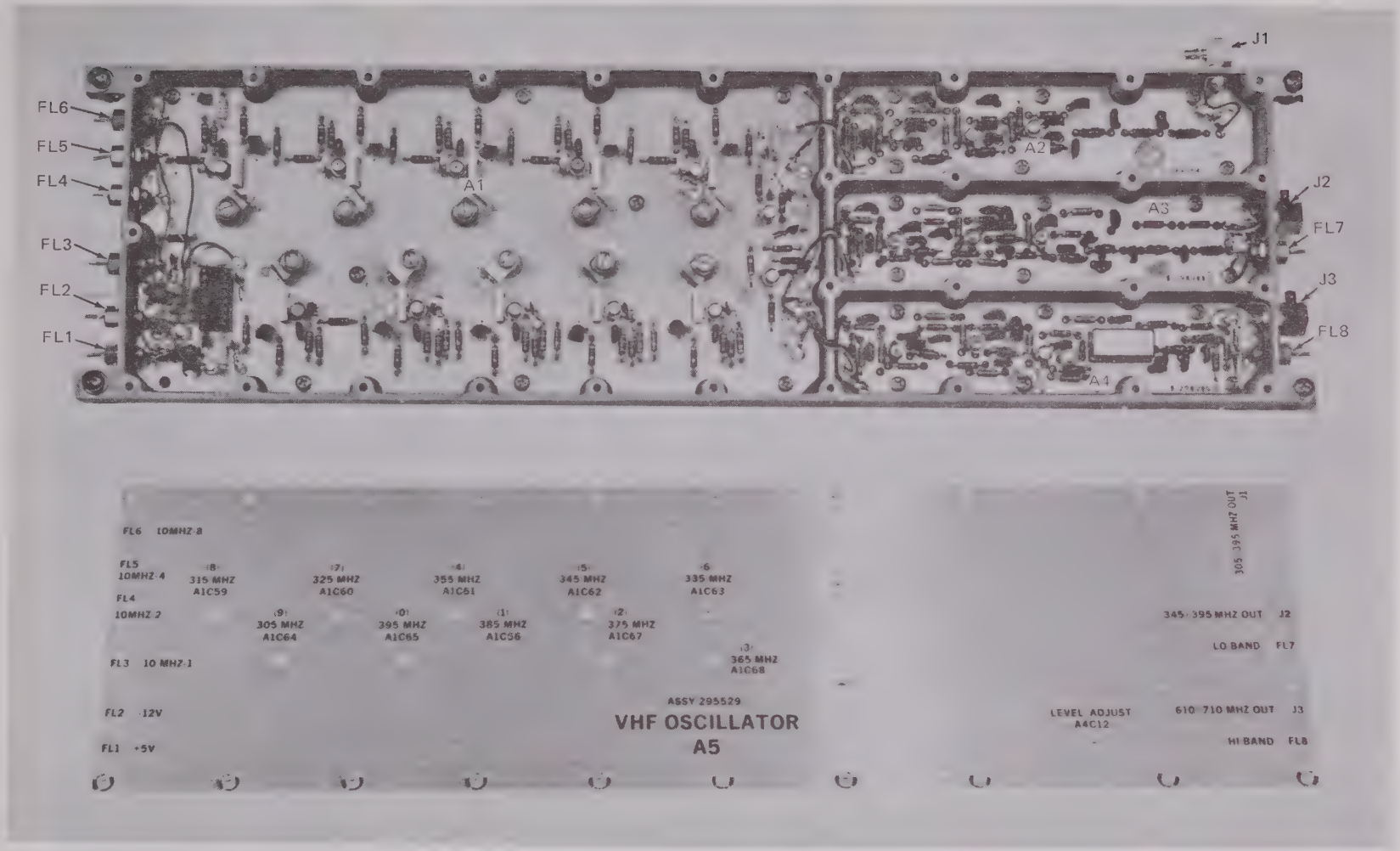


Figure 4-20. VHF Oscillator Assembly A5, Component Locations

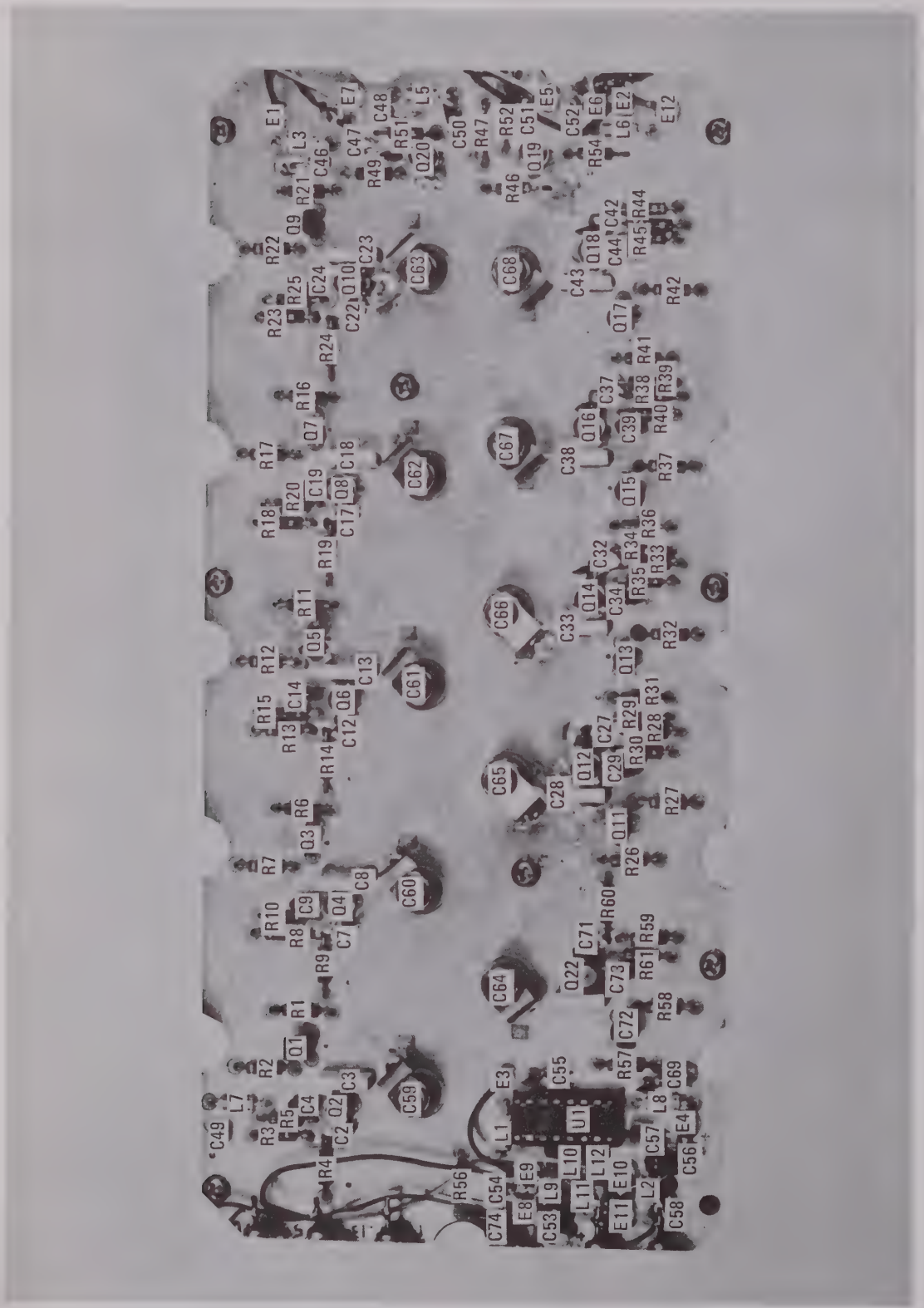


Figure 4-21. VHF Oscillator Board A5A1, Component Locations

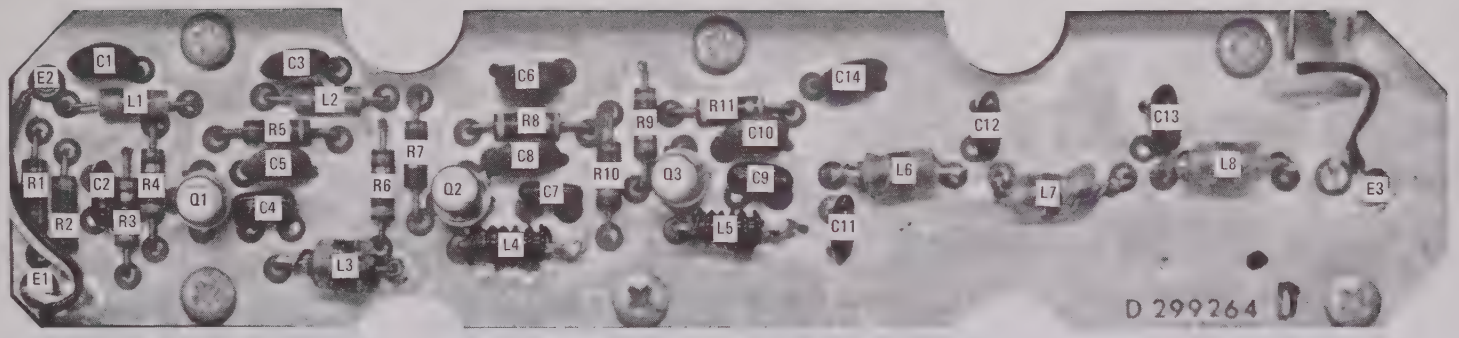


Figure 4-22. 305-395 MHz Isolation Amplifier A5A2, Component Locations

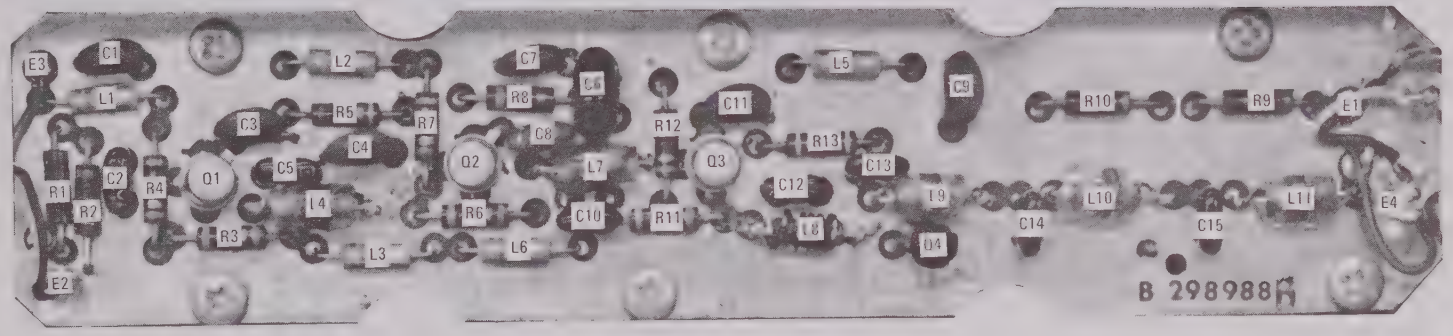


Figure 4-23. 345-395 MHz Switched Isolation Amplifier A5A3, Component Locations

R3, R6, and R11 of amplifiers Q1, Q2, and Q3 and turns these stages on. For signals above 60 MHz, the LO band logic signal goes high turning Q4 off. This causes the base emitter junctions of Q1, Q2, and Q3 to be reverse biased so the amplifier does not pass any signals.

4-44. Switched Isolation Doubler A5A4. Switched Isolation Doubler A5A4 (Figure 4-24) is similar to the A5A3 board, but final stage Q3 drives frequency doubler M1. The doubled frequency of 610 to 710 MHz is passed through a low pass filter consisting of L8, L9, C14, and C15. The circuit is turned on for frequencies above 60 MHz by the HI band logic signal. The board provides a -9 dBm signal in 20 MHz increments between 610 and 710 MHz.

4-45. 610-710 MHz FILTER CONVERTER A6. The 610-710 MHz Filter Converter (Figures 4-25 and 4-26) provides three functions: (1) Contains the Band 1 mixer and amplifier circuits, (2) Generates the DR1 switch driver signal from the LO Band logic signal, and (3) contains a 610-710 MHz bandpass filter to reduce unwanted harmonics from the doubled VHF oscillator signal.

4-46. 610-710 MHz Converter Board A6A1. The converter board A6A1 (Figure 4-27) receives the switched 395-405 MHz signal from A7J4 at a nominal +16 dBm level. This signal is applied to the LO port of mixer M1. The VHF oscillator signal covering 345-395 MHz in 10 MHz steps is received at J2, and applied to the R port of mixer M1 through a 22 dB attenuator. The 1-60 MHz Band 1 signal appears at the I port of M1, and is applied to a two stage switched amplifier Q2 and Q3 through a 3 dB pad and low pass filter, to reduce harmonics.

4-47. Bias for the first stage, Q2, is derived through R3 and Q1 which is driven from the LO Band logic signal. For frequencies below 60 MHz, this logic signal is low and Q1 conducts, completing the bias path for the base of Q2, and allowing amplification to occur. For frequencies above 60 MHz, the logic signal is high, and Q1 is off. The bias path for Q2 is now open and Q2 is off, preventing amplification.

4-48. A switch driver signal, DR1, used to provide diode switch drive to the 395-405 MHz power amplifier A7A1, is taken from the collector of Q1. When the $\overline{\text{LO}}$ Band logic signal is low (Below 60 MHz) and Q1 is conducting, DR1 furnishes +2 volts drive. When the logic signal is high (above 60 MHz) and Q1 is off, DR1 provides -6 volts bias to the A7A1 board.

4-49. Band Pass Filter Board A6A2. Board A6A2 (Figure 4-28) is a seven section, eighth wave capacitive tuned stripline filter which passes 610 to 710 MHz from VHF oscillator A5 to the X5 multiplier driver A7A3. This filter attenuates the unwanted fundamental and harmonics present at the output of switched isolator doubler board A5A4.

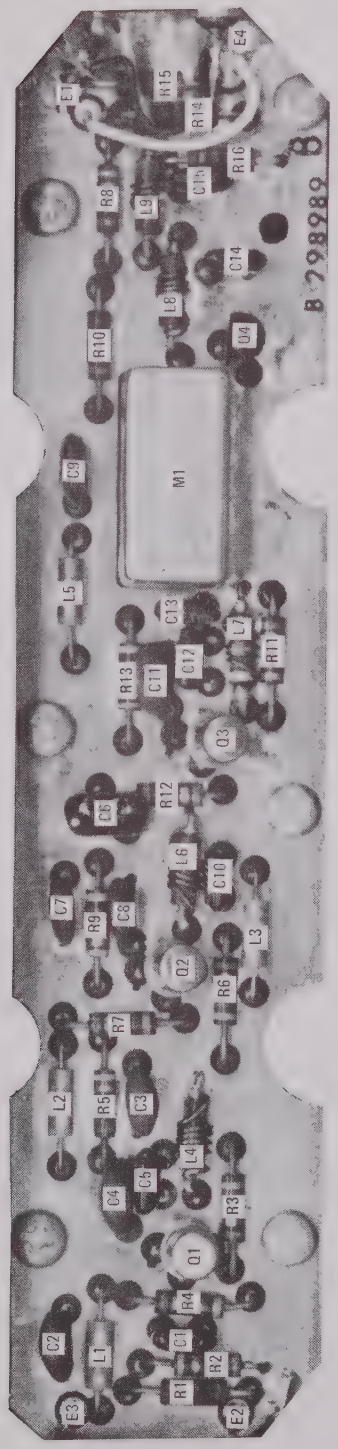
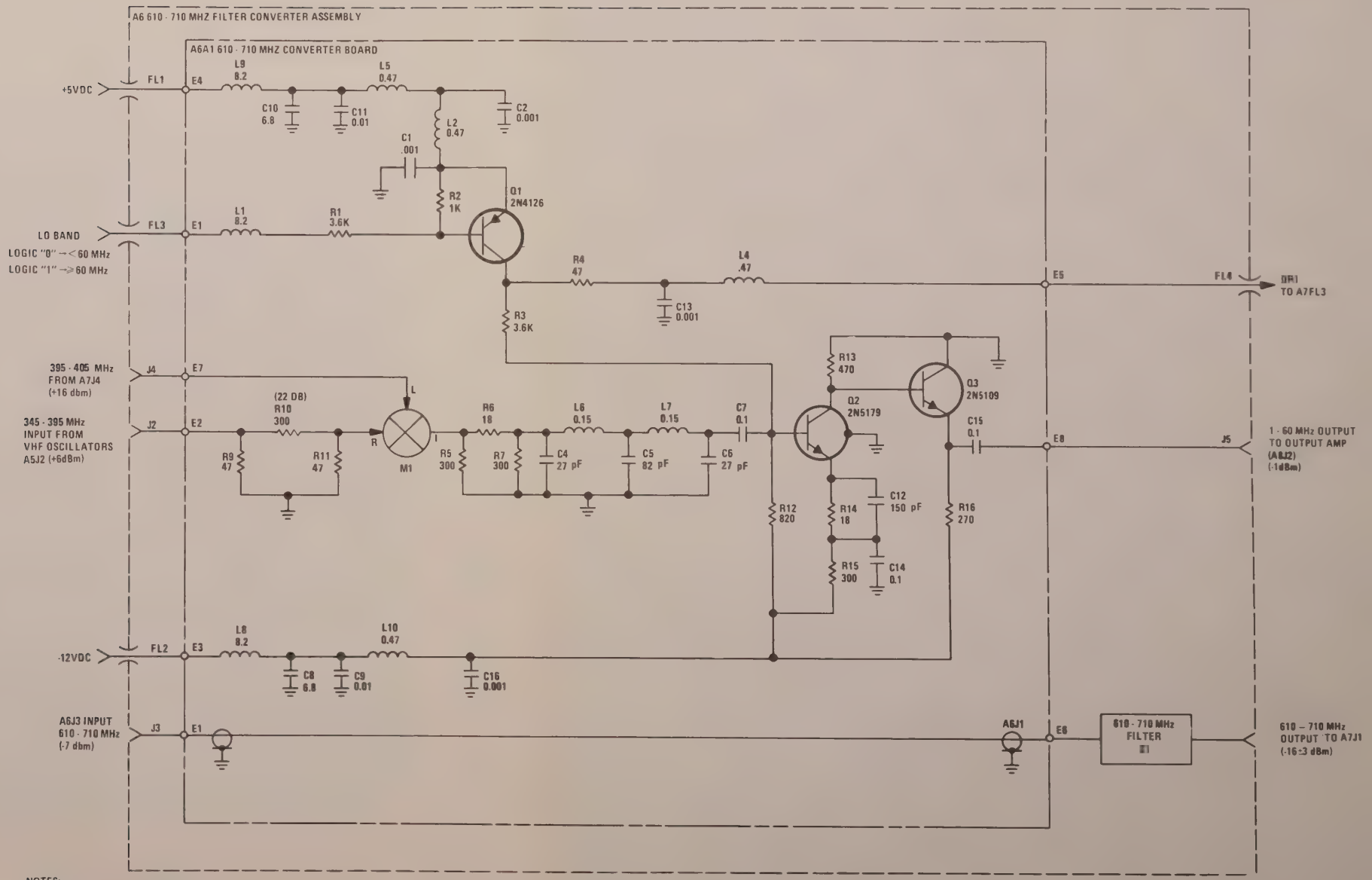


Figure 4-24. Switched Isolation Doubler A5A4, Component Locations



NOTES:
UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
INDUCTOR VALUES ARE IN μH

Figure 4-25. 610-710 MHz Filter Converter A6, Schematic Diagram

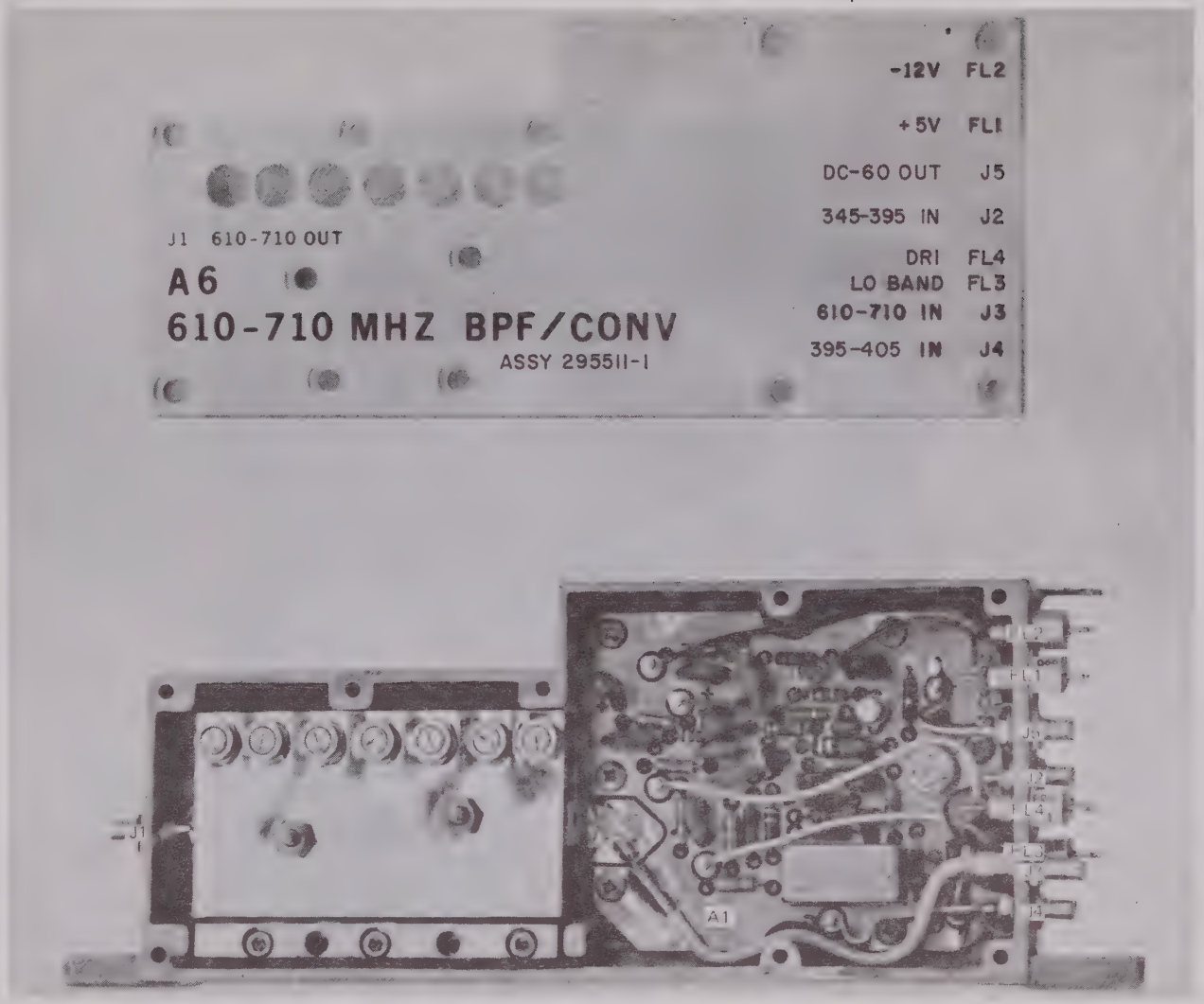


Figure 4-26. 610-710 MHz Filter Converter Assembly A6, Component Locations

Figure 4-27. 610-710 MHz Converter Board A6A1, Component Locations

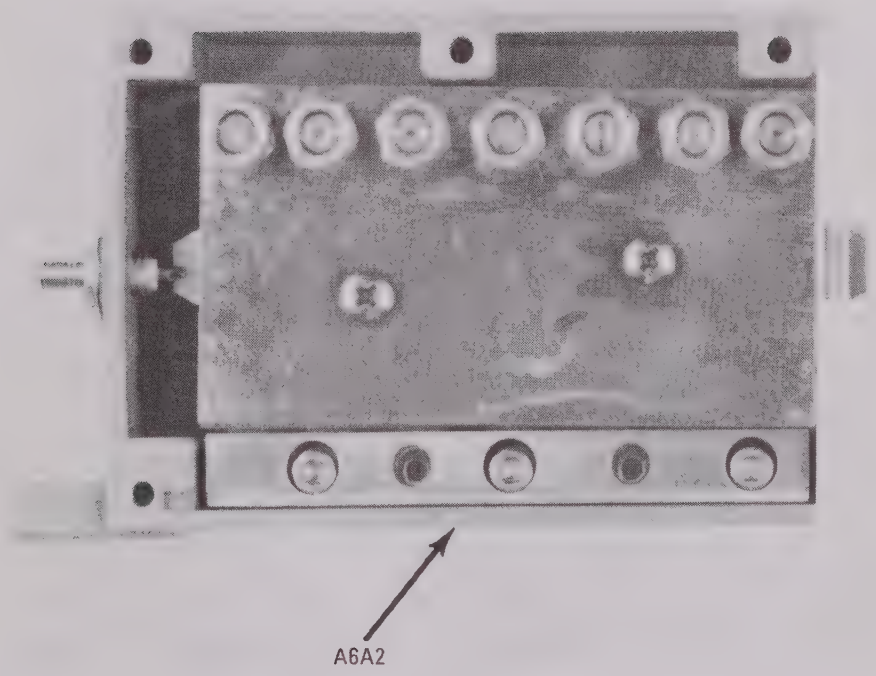


Figure 4-28. Bandpass Filter Board A6A2

4-50. MULTIPLIER SECTION A7. (See Figures 4-29 and 4-31)

4-51. 390 MHz Power Amplifier Board A7A1. The A7A1 390 MHz power amplifier board (Figure 4-31) receives the 395 to 405 MHz signal from A4J2 at a nominal 9 dBm power level, and amplifies this signal to a level of 3 watts, sufficient to drive the X10 multiplier. This board also provides a lower level +16 dBm signal out at A7J4, which is applied to A6J4 for use in Band 1 range.

4-52. The amplifier provides a drive level of 3 watts for the X10 multiplier, and consists of two class A stages, Q1 and Q2, followed by two class C stages Q3 and Q4.

4-53. A lower level +16 dBm signal is inductively coupled to L9 and fed to output connector J4 from terminal E8 for Band 1 operation. This signal passes through a 3 dB pad and a diode switch CR1. C12 is a variable capacitor which adjusts the amplitude of the lower level signal.

4-54. For frequencies below 60 MHz, DR1 is at +2 volts which forward biases CR1, CR2 and CR3. The signal passes through CR1 to J4. CR2 is conducting and attenuates the RF drive to Q4. Collector supply voltage is also removed from Q4 by switching transistor Q5, which is biased off by the positive CR1 voltage. The switching action of CR2 and Q5 removes RF drive to the X10 multiplier.

4-55. For frequencies 60 MHz and above, DR1 is at -6 volts, which reverse bias CR1, CR2 and CR3, thereby attenuating the lower level signal to J4 and passing the signal to amplifier Q4. Switch Q5 is forward biased through R17, and Q4 supplies 3 watts drive to the X10 multiplier. C9 is a tuning adjustment and C20 provides adjustment of the drive level into the X10 multiplier.

4-56. 610-710 MHz Amplifier Board A7A3. The 610-710 amplifier A7A3 (Figure 4-33) receives the doubled VHF oscillator frequencies which have been filtered through A6A2, and amplifies the signal to a level of +20 dBm minimum, sufficient to drive the X5 multiplier. The amplifier consists of a broadband integrated circuit amplifier A1, which provides a nominal 15 dB gain, followed by two broadband common emitter stages Q1 and Q2. The output is coupled from the printed circuit line in the collector of Q2, to E2 through a 3 dB pad.

4-57. X5 Multiplier Filter Assembly A7A4. This assembly A7A4 (Figure 4-34) consists of a step recovery diode multiplier followed by a stripline bandpass filter. The multiplier receives the 610 to 710 MHz signal at a minimum level of 100 mW, and applies it to the impulse generator consisting of L4 and CR1, through the matching network C1, C2, C3, C4, C5, L1, L2, and L3. The impulse generator is coupled to a 15 section broadband filter, 3050 to 3550 MHz, through a resonant line, a series adjustable capacitor C6, and a 3 dB attenuator AT1. The filter converts most of the energy of the impulse train to the X5 frequency within its passband. Self bias for CR1 is provided by potentiometer R2. The filter attenuates all but the desired frequency range, and furnishes a nominal -15 dBm level at J2, through a 6 dB attenuator AT2.

4-58. X10 Multiplier Filter Assembly A7A2. This assembly A7A2 (Figure 4-32) is similar to the A7A3 multiplier. The 395-405 MHz signal at a level of 3 watts is applied to an impulse generator

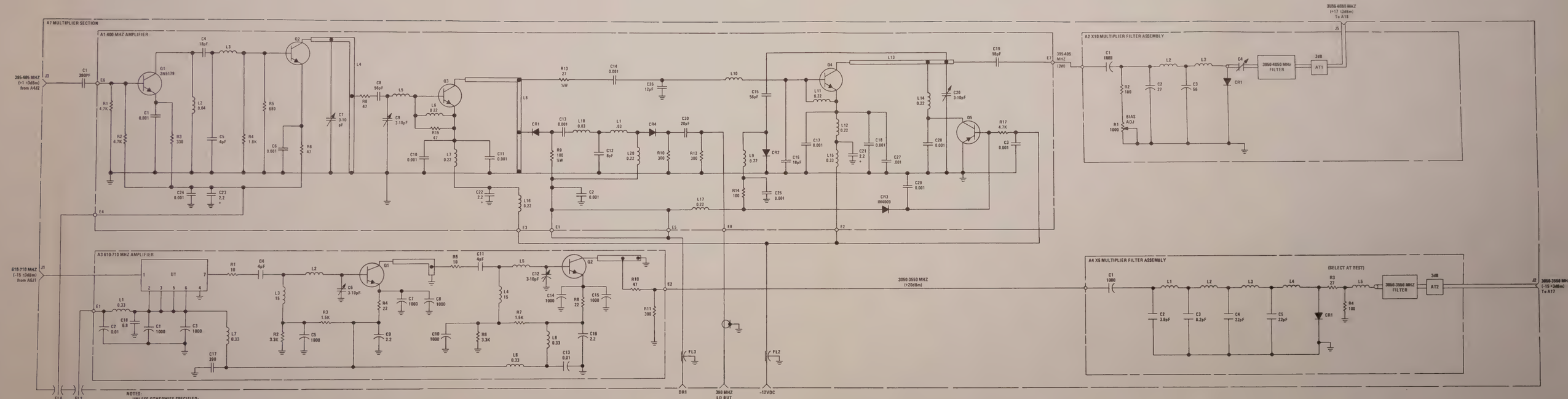


Figure 4-29. Multiplier Section A7, Schematic Diagram

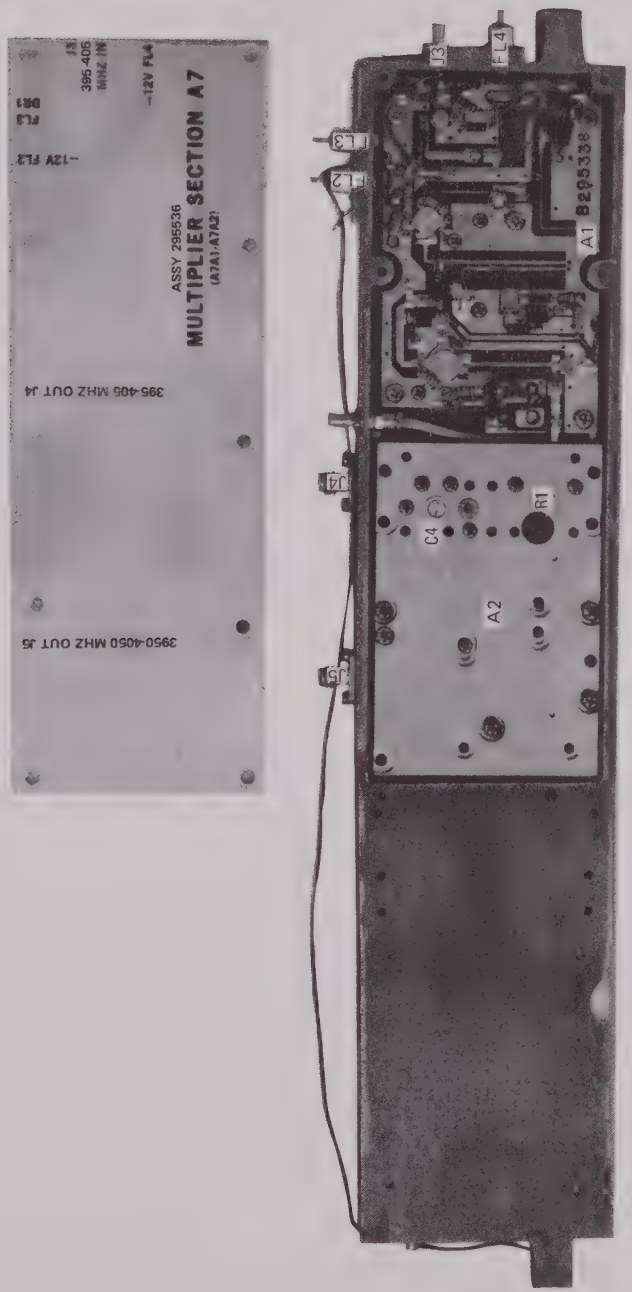


Figure 4-30. Multiplier Section Assembly A7 (Sheet 1 of 2)

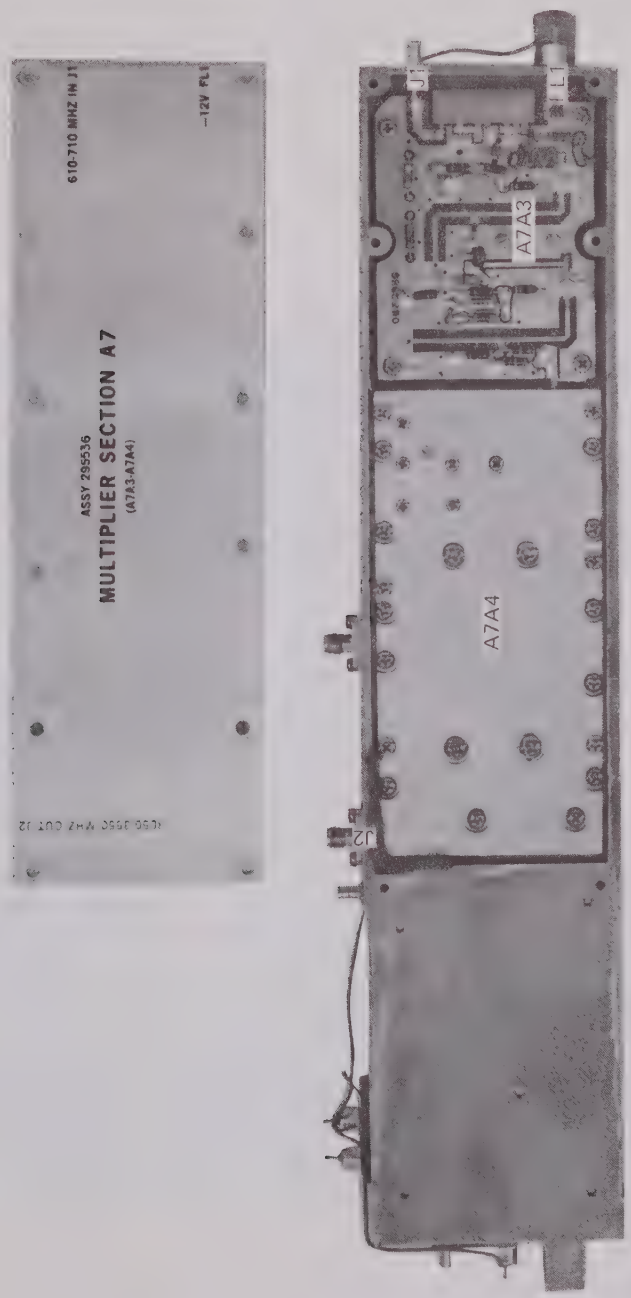


Figure 4-30. Multiplier Section Assembly A7 (Sheet 2 of 2)

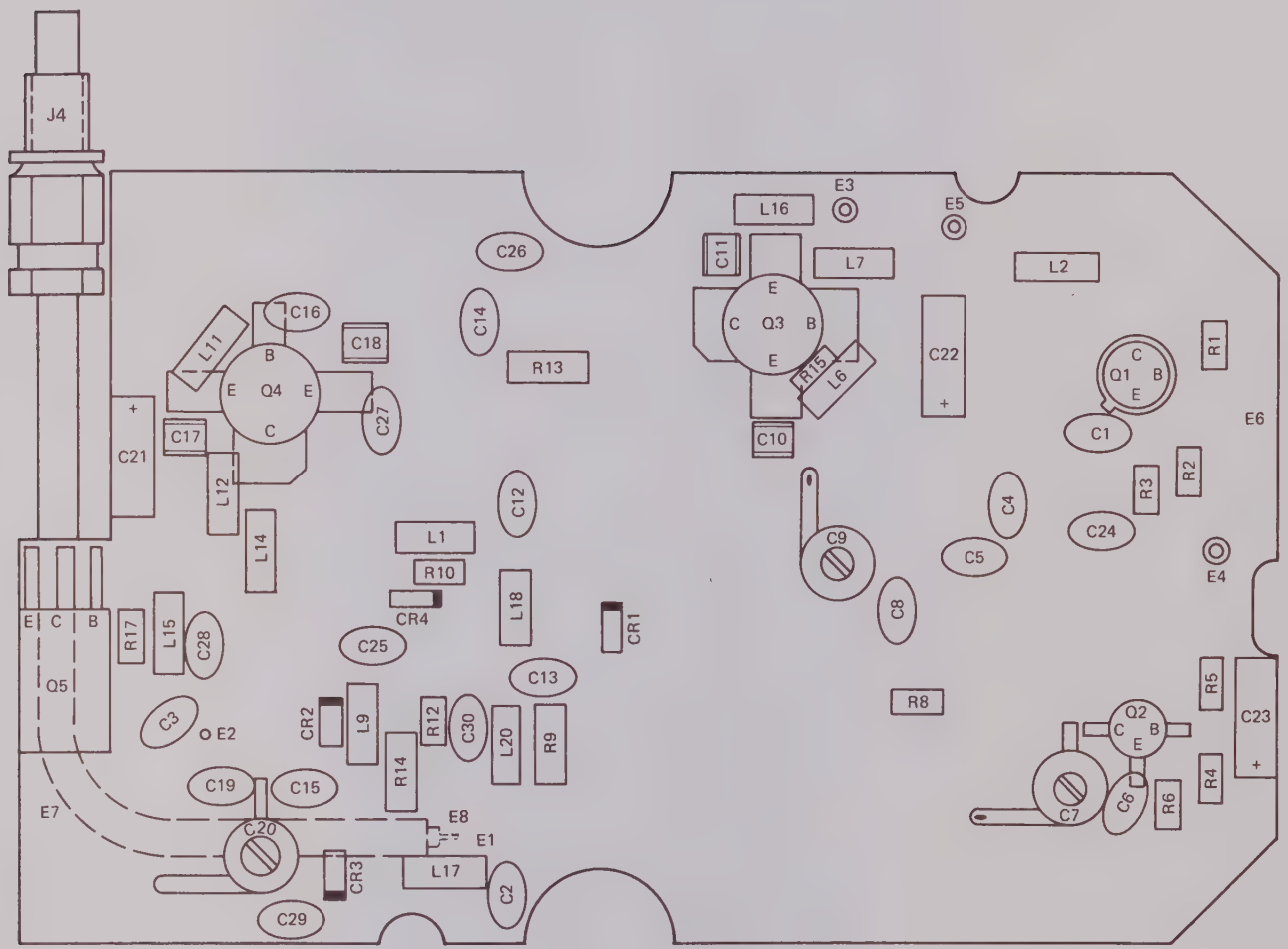


Figure 4-31. 390 MHz Power Amplifier Board A7A1, Component Locations

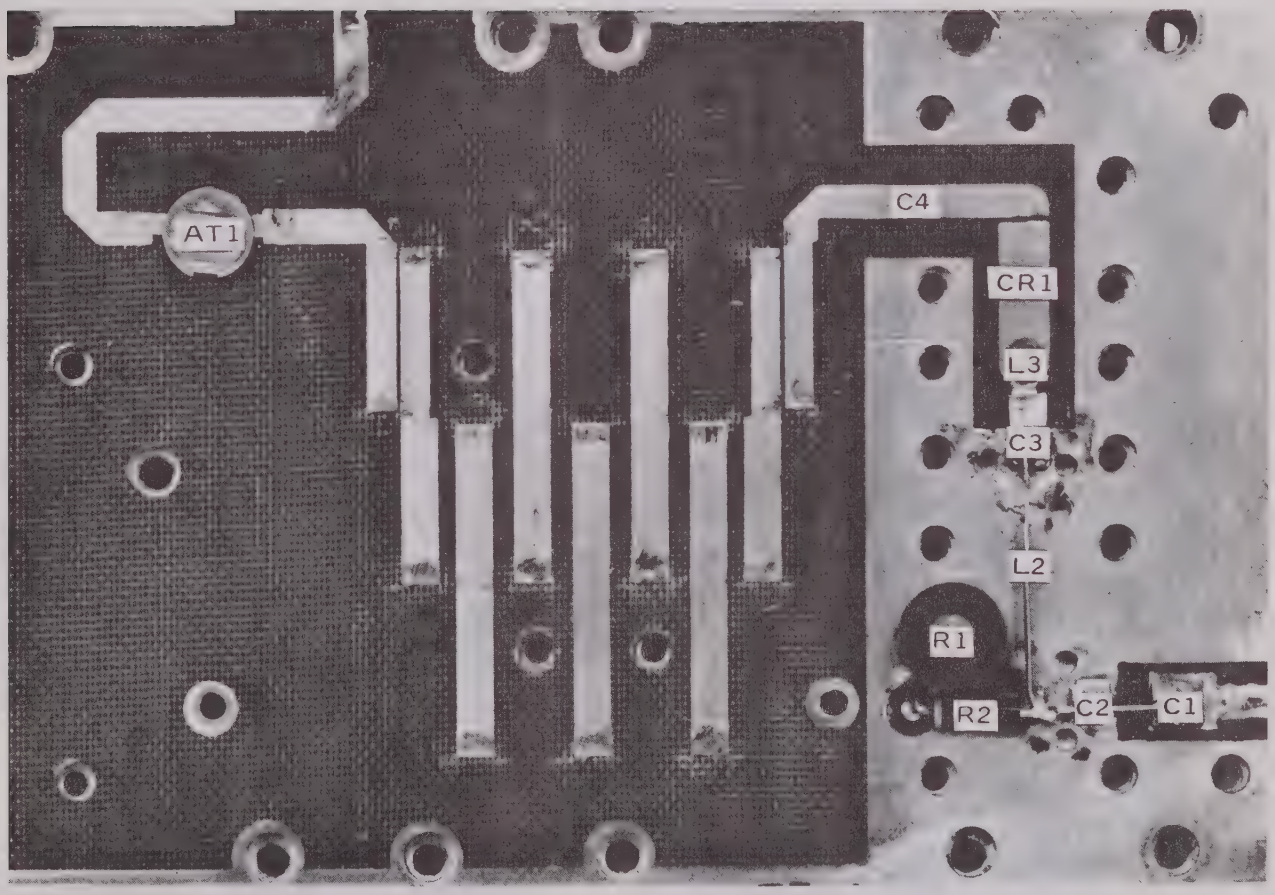


Figure 4-32. X10 Multiplier Filter Assembly A7A2, Component Locations

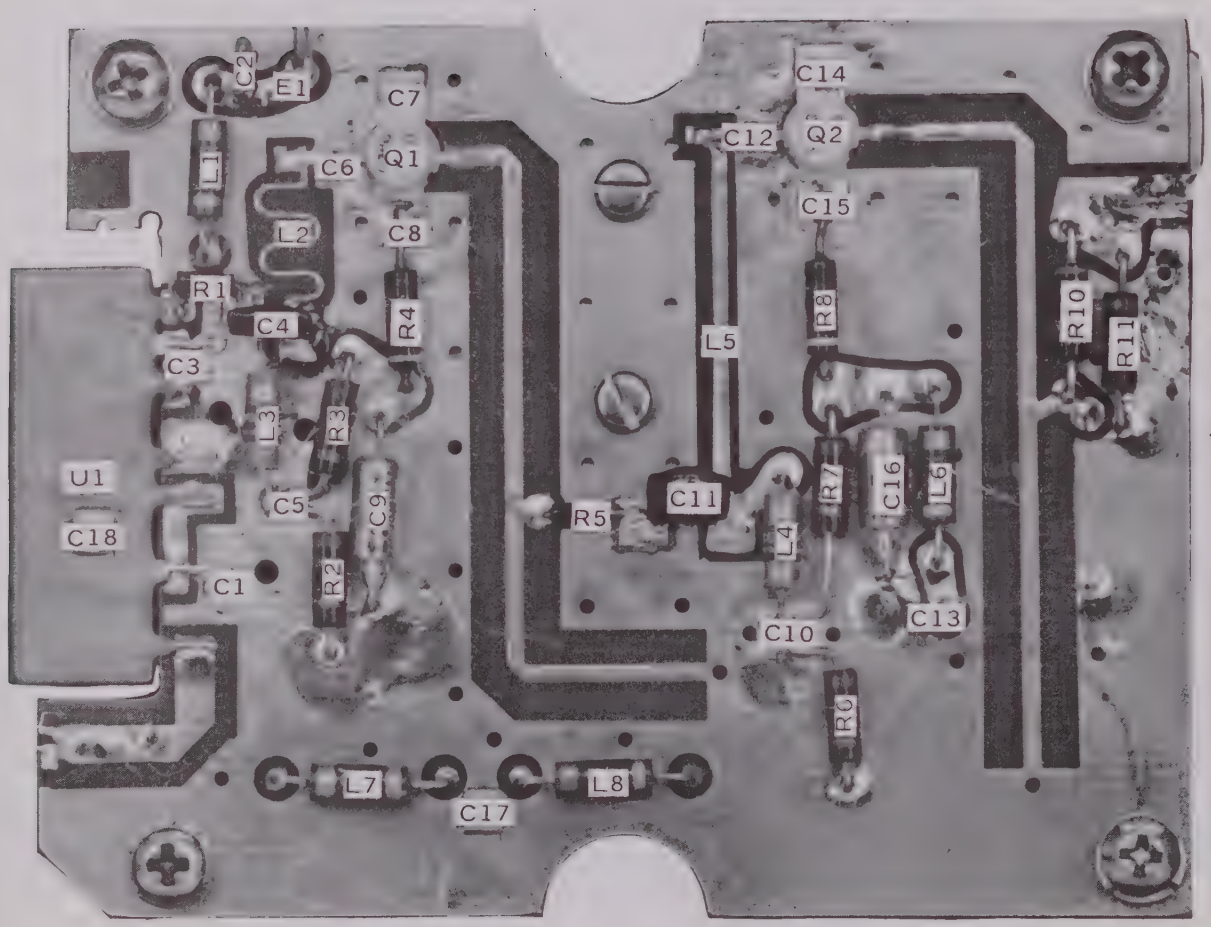


Figure 4-33. 610-710 MHz Amplifier A7A3, Component Locations

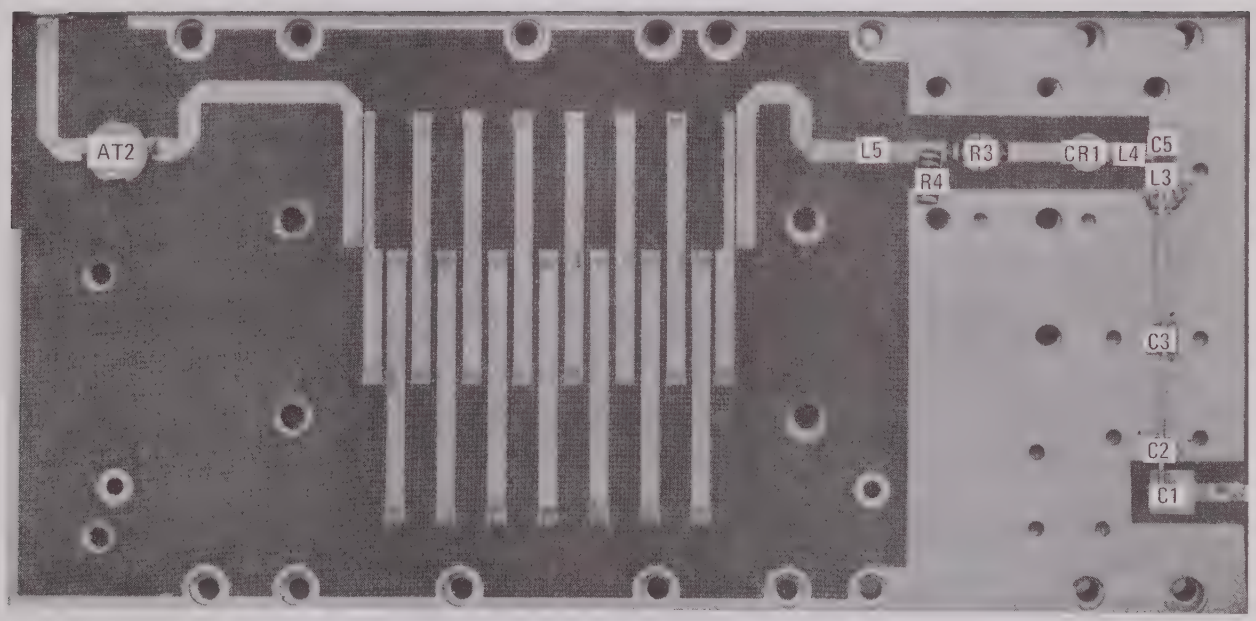


Figure 4-34. X5 Multiplier Filter Assembly A7A4, Component Locations

consisting of L3 and CR1. The resulting impulse train is coupled to the filter through a resonant line and adjustable series capacitor C4. Self bias for CR1 is provided by potentiometer R1. The filter attenuates the unwanted harmonics a minimum of 60 dB. The filter output is connected to J5 through a 3 dB attenuator, AT1. This multiplier provides a nominal +15 dBm level in the 3950 to 4050 MHz range.

4-59. OUTPUT SECTION A8. The output section A8 (Figures 4-35 and 4-36) contains the frequency scaler board A8A1 and the output amplifier board A8A2.

4-60. Frequency Scaler Board A8A1. The frequency scaler board A8A1 (Figure 4-37) receives the Band 1 synthesized signal 1-59.999 . . . MHz) at J2, and the Band 5 synthesized signal (400 to 999.999 . . . MHz) at J1. For operation in Band 1, an input appears at J2 and there is no input at J1, because of the state of the diode switches in A7A1. Band logic (See Table 4-1) is also applied to a BCD to decimal decoder, U5, through FL3, FL4, and FL5. In Band 1, U5-2 is low and all other outputs are high thereby turning on Q12. With Q12 on, diodes CR11 and CR12 are forward biased, and the Band 1 signal from J2 through the low pass filter L28, L29, L30, C73, C74, and C75, is passed to the 50 ohm combiner line and switch diode CR16. In all bands except 6, CR17 is non-conducting, and CR16 is forward biased through R81 and R64. The signal is passed from the 50 ohm line through CR16 to the output at J4.

4-61. For operation in Band 5, (400 to 999.999 . . . MHz) the Band 1 input at J2 is off, and the Band 5 input at J1 is on. The signal is passed through a 3 dB attenuator and a low pass filter to a wideband amplifier U1, which provides a nominal 27 dB of gain. In this band, U5-6 goes low, turning on Q1 (all other outputs of U5 are high). With Q1 on, diodes CR3 and CR4 conduct, and CR2 becomes reversed biased since Q4 is off. The U1 output is blocked by CR2, and passes through CR3, CR4, and CR16 to the output at J4.

4-62. For operation in Band 4, (200 to 399.999 . . . MHz) all outputs of U5 are high except U5-5 which is low. CR3 and CR4 are now reverse biased. Q4 is turned on through CR25 and provides forward bias for CR2, which passes the Band 5 signal to driver amplifier Q3. Driver Q3 provides the necessary drive to high frequency binary divider U2, which is also turned on through Q4. The U2 divider halves the 400 to 800 MHz range to the Band 4 frequencies, 200 to 400 MHz. The divider output is applied to amplifier Q5 through T1. The Q5 output drives divider U3, (which is off due to Q6) and the 50 ohm line through switch diodes CR5 and CR10, and low pass filter C46, C48, L19 and L20. Since U5-5 is low Q11 conducts, turning on diodes CR5 and CR10. The Band 4 signal is passed through CR16 to the output at J4.

4-63. For operation in Band 3, (100 to 199.999 . . . MHz) U5-4 goes low, turning on Q6, which provides supply voltage to binary divider U3. Since Q11 is off in this band CR5 and CR10 are reverse biased. Divider U3 halves the frequency range to 100 to 200 MHz, and passes the Band 3 signal to the J4 output similar to Band 4 operation.

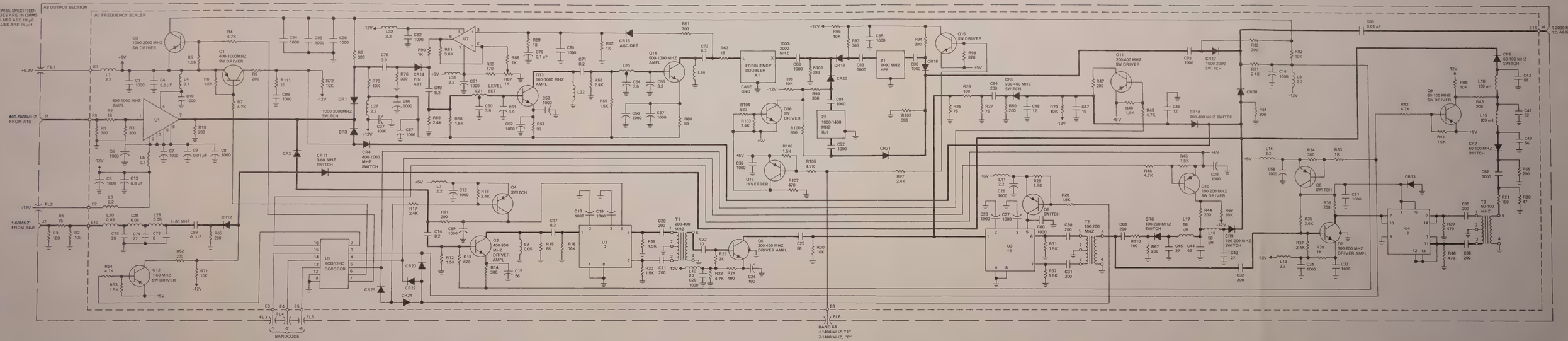


Figure 4-35. Frequency Scaler Board A8A1 Schematic Diagram

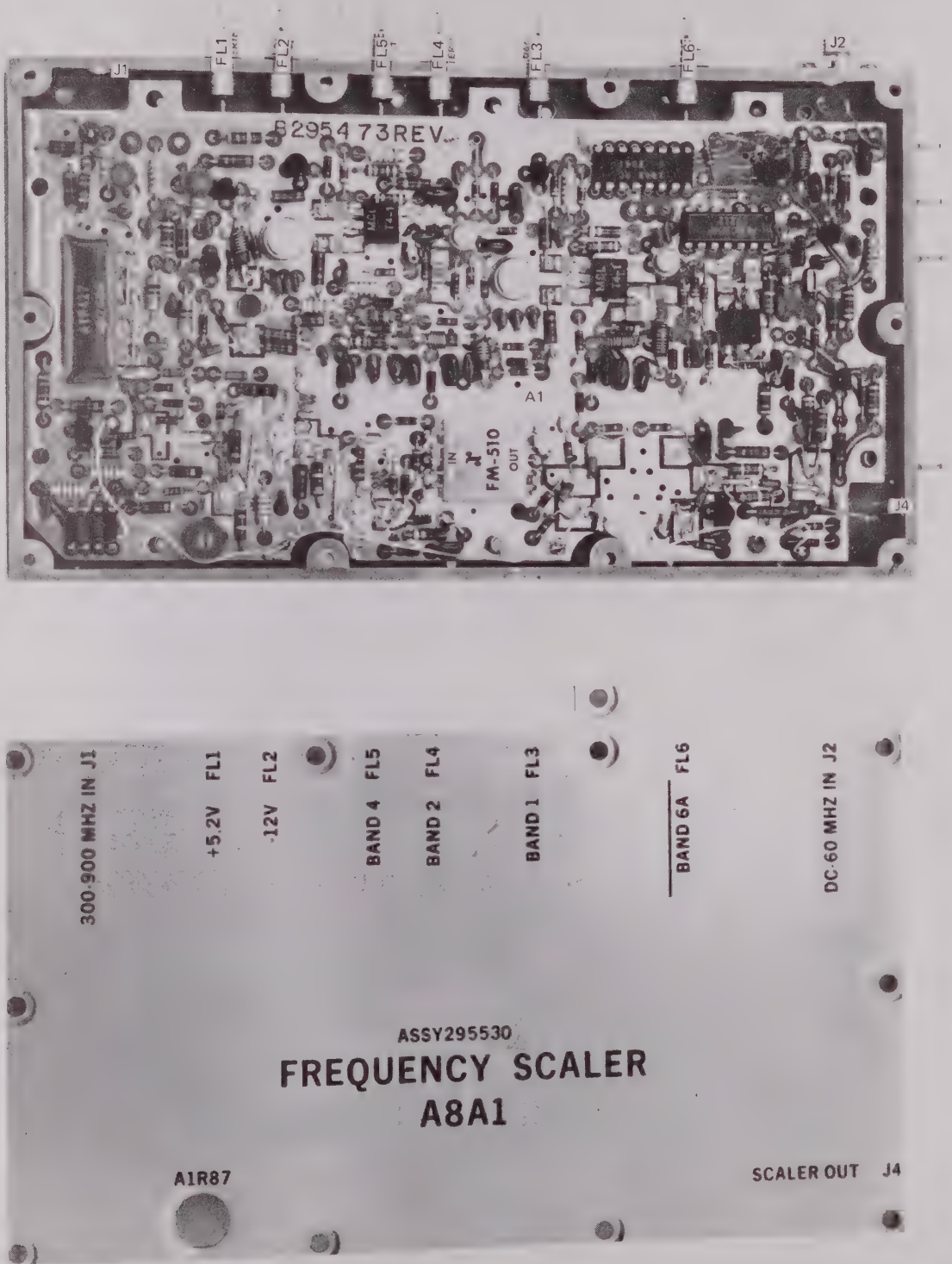


Figure 4-36. Output Section Assembly A8 (Sheet 1 of 2)

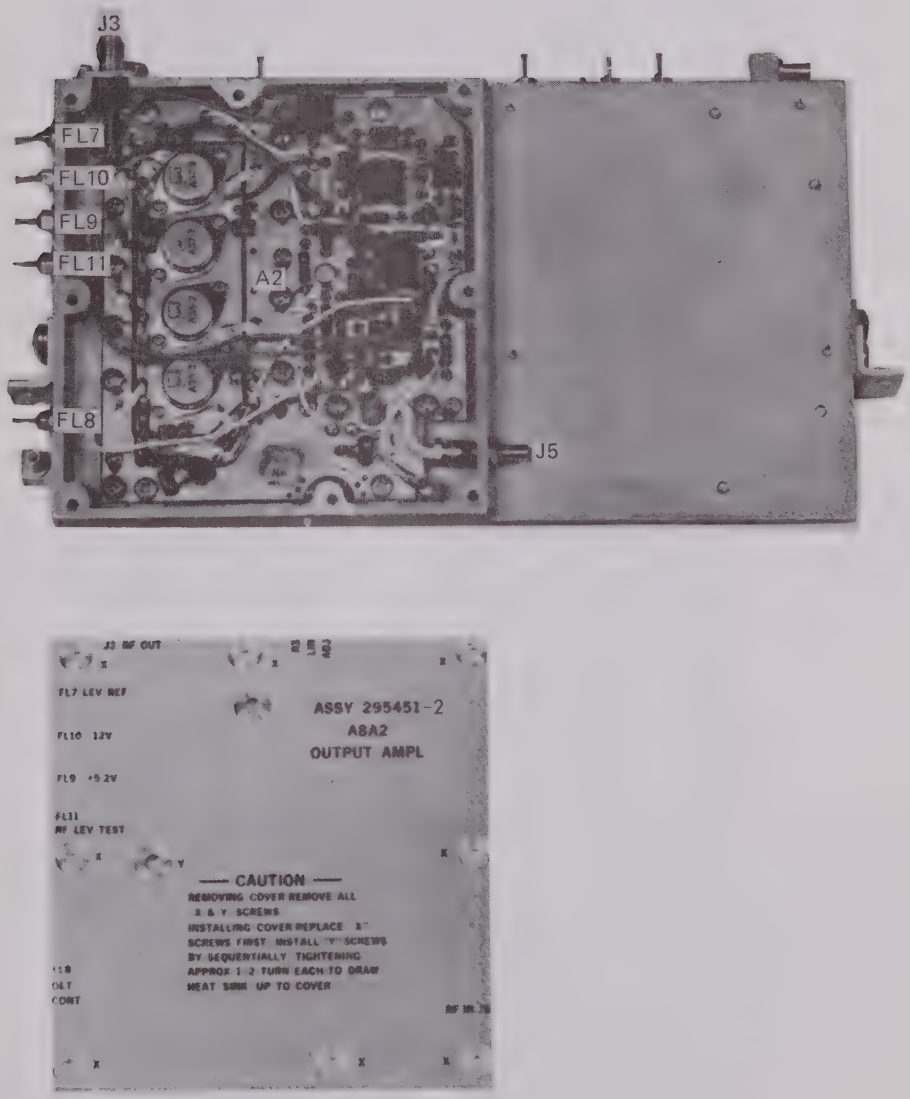


Figure 4-36. Output Section Assembly A8 (Sheet 2 of 2)

Figure 4-37. Frequency Scaler Board A8A1, Component Locations

4-64. Operation in Band 2 (60 to 99.999 . . . MHz) is similar to other bands. Divider U4 is activated, Q9 is on, and diodes CR7 and CR8 are conducting.

4-65. For operation in Band 6 (1000 to 1999.999 . . . MHz) U5-7 goes low, turning on Q2. Since all other switch drivers are off, the Band 5 output from U1 is blocked by CR2 and CR3 but passed through forward biased CR1, and variable attenuator diode CR14, to a two stage driver amplifier Q13 and Q14. The two stages provide a leveled drive of +12 dBm to a broadband frequency doubler X1. The leveling loop consists of detector diode CR15, operational amplifier U7, and attenuator diode CR14. Potentiometer R87 sets a reference level which in turn controls the power level at CR15.

4-66. The doubled output at X1 is at a nominal level of -2 dBm and is passed through a 3 dB attenuator to the junction of diode switches CR18 and CR20. Q17 is driven by the Band 6A logic signal which is high for frequencies below 1400 MHz, and low for frequencies above 1400 MHz. Below 1400 MHz, Q15 and Q17 are off, and Q16 is on. Diodes CR18 and 19 are reversed biased through R95 and CR20 and 21 are biased through Q15. The signal passes through Z2, a 1000-1400 MHz band pass filter, which reduces the level of the subharmonics and harmonics. The signal is applied through C93 to diode switch CR17. In BAND 6, CR17 is forward biased and CR16 is reverse biased, and the signal passes through to the J4 output.

4-67. For frequencies above 1400 MHz, the Band 6A logic signal goes low, turning on Q15 and Q17, and turning off Q16. CR20 and 21 are now reversed biased and CR18 and 19 are forward biased, so that the signal passes through Z1, a 1400 MHz HIGH pass filter. The filter reduces the level of subharmonics and harmonics present at the doubler output. The signal is coupled to the output through C93 as previously described.

4-68. The output at J4, covering all six bands has a nominal output of -7 dBm and is applied to the output amplifier A8A2.

4-69. Output Amplifier Board A8A2. The output amplifier board A8A2 (Figure 4-38) provides an overall gain of 25 dB minimum from 1 MHz to 2000 MHz. The board contains four cascaded hybrid wideband amplifiers, U3, U4, U5, and U6, a leveling diode, CR2, an AGC amplifier, Q1, Q5, Q6, U1 and U2, and two pin diode attenuators, AT1 and AT2 for leveling and amplitude modulation.

4-70. The synthesized 1-2000 MHz signal from A8J4 at a nominal level of -15 dBm is applied to the output amplifier through A8J5. The signal is passed through the pin attenuator AT1 followed by a switched high pass filter C5, C6, and L3, with a cutoff frequency of 10 MHz. The filter is switched by diodes CR1 and CR2. CR1 and CR2 are driven by Q4 which is driven by the DET Control A logic line. This signal is low for frequencies below 10 MHz, and high for frequencies above 10 MHz. Below 10 MHz, CR1 conducts and CR2 is reverse biased, thereby bypassing the filter. Above 10 MHz, CR1 is off and CR2 conducts placing the filter in the signal path. The signal is passed through AT2 and amplified by the cascaded wideband amplifiers U3, U4, U5, U6 and finally applied to connector J3.

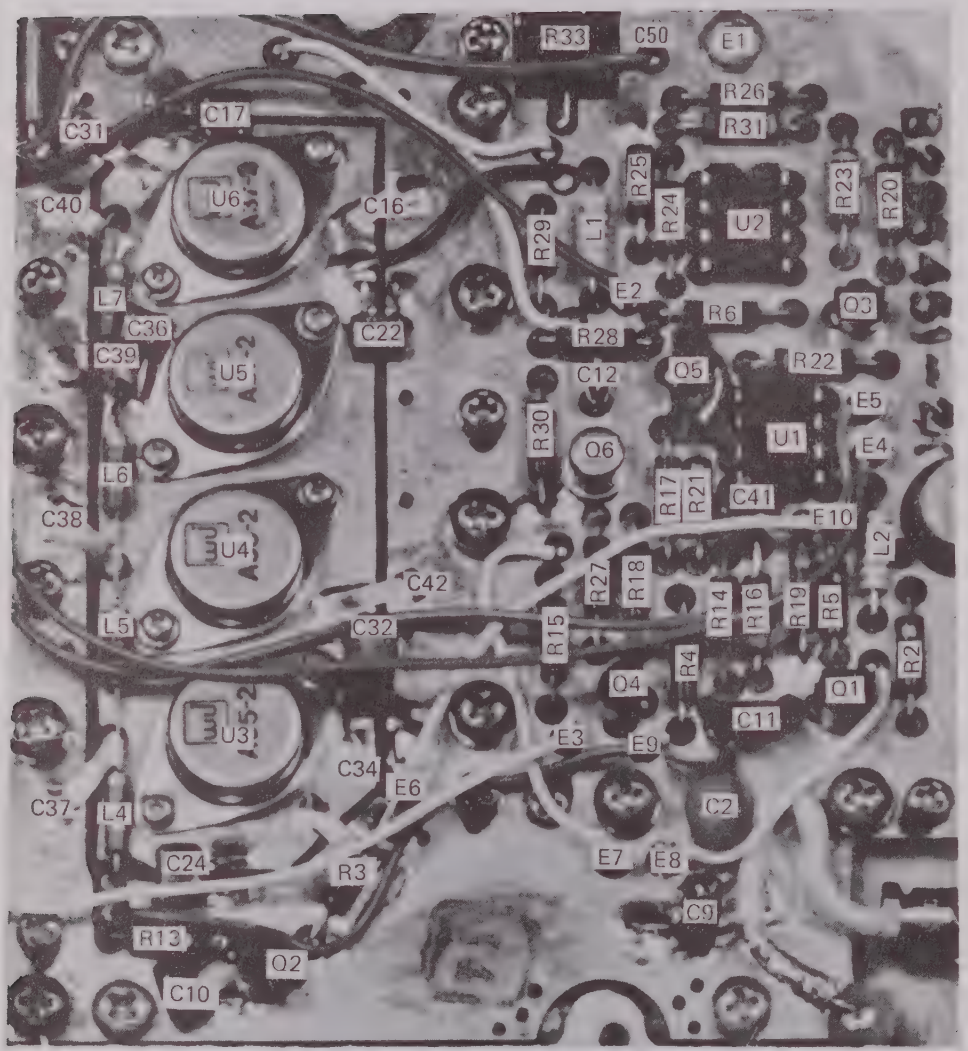
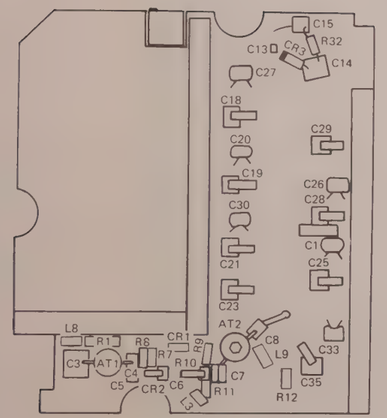


Figure 4-38. Output Amplifier Board A8A2, Component Locations



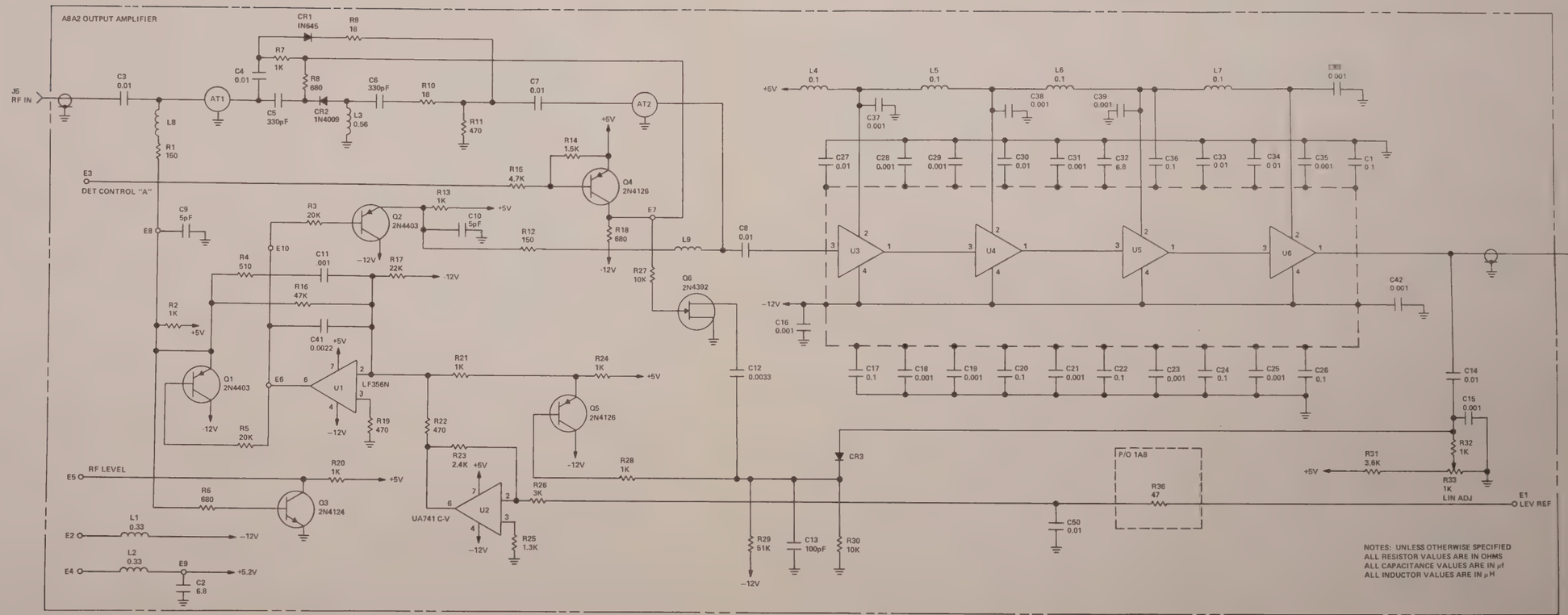


Figure 4-39. Output Amplifier Board A8A2 Schematic Diagram

4-71. The pin attenuators each have an insertion loss of about 1.0 dB, and an on-to-off ratio of greater than 30 dB.

4-72. The leveling diode CR3 is coupled to the output RF line through capacitor C14 Potentiometer R33 sets the bias for CR3 and functions as an amplitude modulation linearity adjustment. The detected DC output of CR3 is proportional to the RF level at the output of U6, and is applied to the summing junction of operational amplifier U1 through the follower Q5. The reference voltage derived from the level reference A3, is applied to the output amplifier board through FL7 at E1. Operational amplifier U2 inverts the level reference and the output is also applied to the summing junction of operational amplifier U1. The output of U1 drives the pin attenuator AT1 through follower Q1 and resistors R1 and R5 and also pin attenuator AT2 through follower Q2 and resistors R3 and R12. The pin attenuator bias is 0 mA for minimum insertion loss, and requires 30 mA drive current for maximum isolation.

4-73. When the synthesizer is amplitude modulated, the modulating signal rides on the level reference signal at E1. In effect the level reference voltage follows the modulating signal and forces the RF output level to change accordingly, thereby providing amplitude modulation. Since modulation is through the leveling loop, the AM bandwidth is restricted to the bandwidth of the leveling loop, which is set by R4 and C11. For frequencies below 10 MHz, it is necessary to increase the bypass capacitance at the output of leveling diode CR3. This is accomplished by the DET control A logic which turns Q4 and Q6 on below 10 MHz, thereby switching in C12 across C13.

4-74. LOGIC CONVERTER A9. Logic converter A9 (Figures 4-40 and 4-41) converts selected input frequencies to the logic control signals listed in Table 4-1, and an Out-of-Range signal for the OUT OF RANGE warning indicator. Figure 4-40 is a block diagram of the logic converter and Figure 4-41 is a schematic diagram and Figure 4-42 shows the component locations. The logic converter requires a 10 1/4 digit BCD frequency input from either the front panel frequency select switches, or a 10 1/4 digit BCD frequency input from a programming source through the rear panel J5 connector. Programming mode is selected by the LOCAL/REMOTE CONTROL located on the mainframe front panel. The logic converter is divided into three primary functions. Input Multiplexer, Arithmetic Section, and Control Section. Prior to a description of each of these sections, a brief discussion of the basic concepts involved in interpreting logic diagrams is given in the following paragraph:

NOTE

For the 380, the A9 logic board is always in a remote condition, no matter what control is being implemented [ie, RF PANEL, LOCAL, or REMOTE].

4-75. BASIC CONCEPTS

4-76. The two basic rules to be followed for understanding logic schematics are as follows:

a. The presence or absence of a bubble at the output of a gate or symbol determines whether a low or high output voltage exists, respectively.

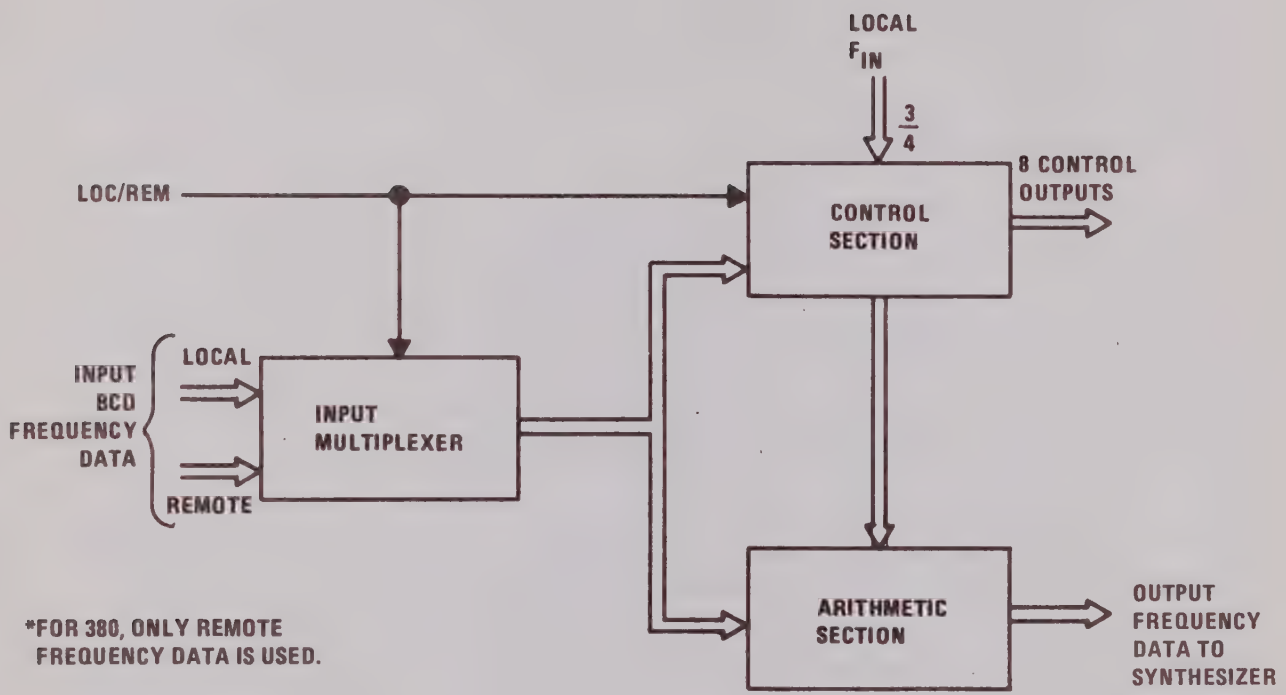


Figure 4-40. Logic Converter A9, Block Diagram

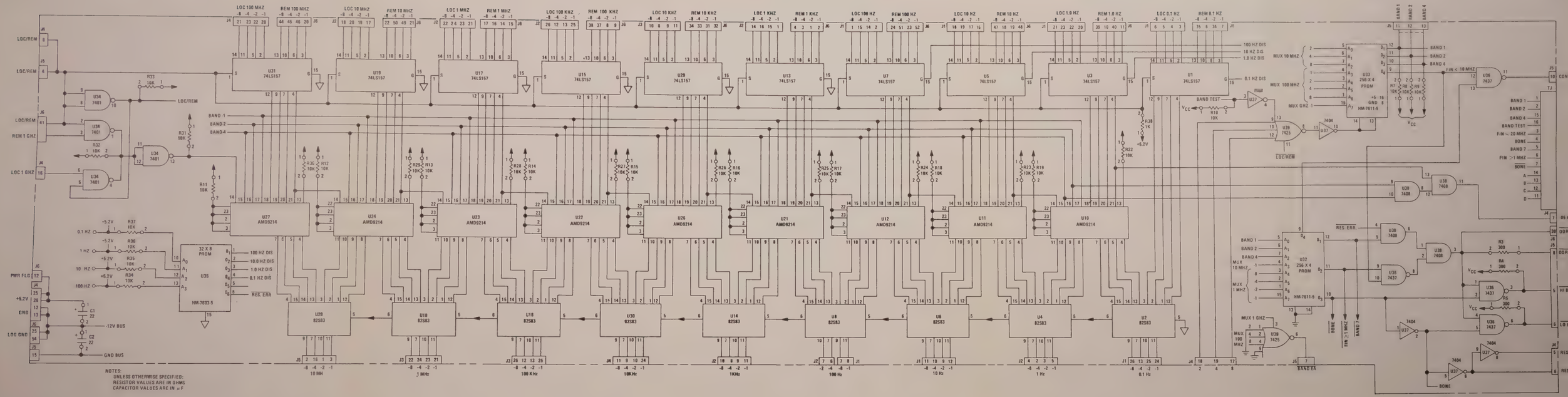


Figure 4-41. Logic Converter A9, Schematic Diagram

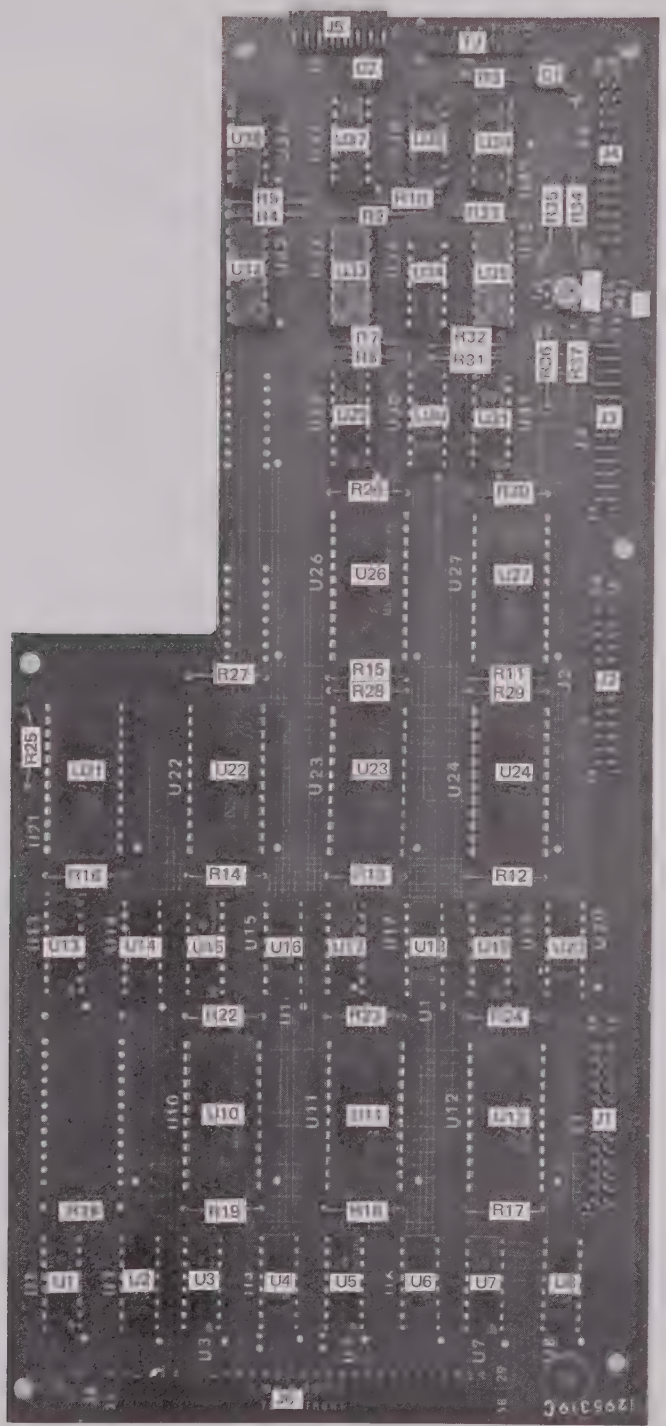


Figure 4-42. Logic Converter A9, Component Locations

b. The logic name of a signal should agree with the output of the gate or symbol that generates the signal. For example, an unbubbled output should be assigned an unbarred signal name; a bubbled output should be assigned a barred signal name.

4-77. Another way to interpret these rules is that a barred signal represents a normally high state which will exist when the condition indicated by the signal statement is not true. When the signal statement is true, it will go to its active or low state. Obviously the opposite would apply to an unbarred signal. The conditions and states are as shown in Table 4-3. Notice that the above two rules restrict themselves to correlating the bubbles and signals names with respect to gate outputs. It would be logical to assume that a correlation should also exist with respect to gate inputs, but this is not always true as will be described in subsequent paragraphs.

4-78. INPUT MULTIPLEXER. The input multiplexer consists of ICs A9U1, 3, 5, 7, 13, 15, 17, 19, 29, 31, 34, and 35. This section selects the BCD frequency data from the front panel frequency select switches (Local Mode) or the rear panel remote programming connector J5 (Remote Mode). Transfer is controlled by the LOC/REM logic signal from the front panel LOCAL/REMOTE CONTROL (LOC = "0", REM = 1). The 10¼ multiplexed output data is applied to the Arithmetic Section and the 3¼ most significant digits (1 GHz-1, 100 MHz, 10 MHz and 1 MHz) are also applied to the Control Section.

NOTE

For 380, BCD frequency data is selected from rear panel remote programming connector J5.

4-79. To accommodate various resolution options, switch S1 and Prom U35 furnish disable signals to the 100 Hz, 10 Hz, 1.0 Hz, and 0.1 Hz MUXs, U1, 3, 5, and 7. Four inputs to U35 are derived from resolution switch S1, and the BONE signal developed in the control section. The truth table for U35 is given in Table 4-4.

TABLE 4-3. LOGIC INTERPRETATION RULES

GATE OUTPUT	SIGNAL NAME	LEVEL	
		SIGNAL TRUE (Active State)	SIGNAL FALSE (Normal State)
	$\overline{\text{BRAND X}}$	L (Is Brand X)	H (Is Not Brand X)
	BRAND X	H (Is Brand X)	L (Is Not Brand X)

TABLE 4-4. A9U35 TRUTH TABLE

A9S1 SETTING		PINOUTS									
		OUTPUTS					INPUTS				
		1	2	3	4	6	10	11	12	13	14
< 60 MHz	0.1 Hz	0	0	0	0	1	0	1	1	1	1
	1.0 Hz	0	0	0	1	1	1	0	1	1	1
	10 Hz	0	0	1	1	1	1	1	0	1	1
	100 Hz	0	1	1	1	1	1	1	1	0	1
> 60 MHz	0.1 Hz	0	0	0	1	1	0	1	1	1	0
	1.0 Hz	0	0	1	1	1	1	0	1	1	0
	10 Hz	0	1	1	1	1	1	1	0	1	0
	100 Hz	1	1	1	1	1	1	1	1	0	0

4-80. Arithmetic Section. The arithmetic section consists of ICs A9U2, 4, 6, 8, 10, 11, 12, 14, 16, 18, 20, 21, 22, 23, 24, 26, 27, 30, and 38, All frequencies developed by the synthesizer are divided into 6 frequency ranges, which are all multiples of the Band 1 range, as shown in Table 4-5. Frequency logic inputs for frequencies in Bands 2 through 6 must be divided by the same factor as the RF multiplication factor in order to properly drive the synthesizer logic inputs.

TABLE 4-5. BAND OUTPUT FREQUENCY RF MULTIPLICATION FACTORS

BAND	OUTPUT FREQUENCY MHz	RF MULTIPLICATION FACTOR
1	1-59.999 . . .	1
2	60-99.999 . . .	1.25
3	100-199.999 . . .	2.5
4	200-399.999 . . .	5
5	400-999.999 . . .	10
6	1000-1999.999 . . .	20

4-81. The 1 GHz, 100 MHz and 10 MHz logic is applied to band decoder Prom A9U33 in the control section which provides the band codes listed in Table 4-1. This information is applied to arithmetic ROMs A9U10, 11, 12, 21, 22, 23, 24, 26 and 27. Frequency logic data from the input multiplexer section is also applied to these ROMS. The ROM outputs are applied to adders A9U2, 4, 6, 8, 14, 16, 18, 20, and 30. The ROMs, acting as a look up table, in conjunction with the adders, divide the incoming frequency logic by the RF multiplication factor, and provide the frequency control logic to the synthesizer at the connectors A9J1 through J5.

4-82. To test the logic at connectors J1 through J5, proceed as follows:

a. Set in a frequency (Local or Remote).
b. Determine 10 MHz control from Table 4-1 and verify on A9U20.
c. Determine the band from Table 4-5.
d. Divide the frequency input by the RF multiplication factor in Table 4-5. Ignore 10 MHz and higher digits.
e. Measure the logic levels at J1 through J4 or associated 82S83s, convert this BCD data to the decimal number, and compare to the frequency determined in step 4d.

4-83. Control Section. The control section consists of ICs A9U32, 33, 36, 37, 38 and 39. The control section inputs are the 3¼ most significant digits from the input multiplexer, applied to pins 1, 2, 3, 4, 5, 6, 7, and 15 of PROM A9U33, and the 3 most significant bits of the local 1 GHz logic applied to U39 pins 9, 10, and 12. Table 4-6 lists the control logic signals developed by the control section from these inputs.

TABLE 4-6. SYNTHESIZER CONTROL SIGNALS

LOGIC SIGNAL	FUNCTION	TEST LOCATION	STATE
$\overline{\text{OOR}}$	Logic drive for front panel out of range indicator	U38-3	'0' = In Range '1' = Out of Range
$\overline{\text{LO BAND}}$	Switching signal for A5 and A6	U36-6	'0' = 1 to 59.999 MHz '1' = $\geq$ 60 MHz
$\overline{\text{HI BAND}}$	Switching signal for A5	U36-3	'0' = $\geq$ 60 MHz '1' = $<$ 60 MHz
DET CONTROL A	Switches AGC Time Constant of Output Amplifier A8A2	U36-11	'0' = 1.0 to 10 MHz '1' = $>$ 10 MHz
$\overline{\text{BAND 6A}}$	Switches LPF's in A8A1 to reduce harmonics in Band 6	U39-6	'0' = $\leq$ 1400 MHz '1' = $>$ 1400 MHz
RESLT 1	Logic drive for 1 Hz front panel indicator	U37-6	'0' = 1 to 59.999 MHz '1' = $\geq$ 60 MHz

TABLE 4-6. SYNTHESIZER CONTROL SIGNALS (Cont)

LOGIC SIGNAL	FUNCTION	TEST LOCATION	STATE
RESLT 2	Logic drive for 10 Hz front panel indicator	U37-8	'0' = $\geq$60 MHz '1' = 1 to 59.999 MHz
Band Code	Switches RF dividers in A8A1. Also used in PM3602 for normalizing FM and phase modulation.	TJ7 1,2,15	See Table 4-1

4-84. CALIBRATION

4-85. GENERAL. The following paragraphs provide critical adjustment procedures that must be performed to ensure proper calibration of the RF section plug-in unit. Adjustment procedures are provided for output level and modulation linearity, modulation sensitivity, VHF oscillator frequency, and stripline filter passbands.

4-86. SYSTEM CALIBRATION AND ADJUSTMENTS

4-87. OUTPUT LEVEL AND MODULATION LINEARITY. Set the upper and lower limits of the front panel level control vernier and the linearity of the amplitude modulation. These adjustments can be performed with the plug-in installed in the mainframe and the right side panel removed.

a. Remove the right side panel and top cover.
b. Set synthesizer for 1 GHz output frequency. If the unit is a 380, set for RF panel control, if unit is a 360, set for local mode. [If system has a PM3602, place in CW mode.]
c. Connect the power meter and a calibrated 6 dB attenuator to the RF output.
d. Rotate the front panel RF level VERNIER control to its full clockwise position +10 dBm. If unit has 183 attenuator option, set 10 dB step switch to 0 dBm and set VERNIER to +5 dBm. Set A3R8 (located on side of plug-in near front) fully clockwise. Adjust A3R3 for +10 dBm for systems without attenuator option, and +5 dBm for systems with 183 attenuator option.
e. Rotate front panel VERNIER fully counterclockwise. Adjust A8R3 (located in A8 module, attainable from top of A8 module near right rear corner of plug-in), so that output power reads same as minimum reading on front panel vernier.
f. Repeat steps d. and e. until 1-2 db above correct reading of MIN output level.
g. Adjust A3R8 for correct power at MIN LEVEL.
h. Connect a spectrum analyzer to the RF OUTPUT. Set the spectrum analyzer to 1.0 GHz center frequency, 10 kHz/cm, 5 dB/cm and use the 1 kHz IF Bandwidth.

i. Set front panel vernier to +10 dBm. If unit contains the PM3602 AM/FM/ØM modulator, set for AM mode, external source, and +5 dBm output level. Connect a 10 kHz sinewave to the MOD IN connector on the front panel. Adjust the level of the sinewave until the modulation sidebands are 12 dB below the carrier (approximately 0.5 VRMS).

j. Rotate front panel RF Level VERNIER control to 0 dBm. (-6 dBm with 183 Attenuator Option). Remove (3) logic board hold-down screws and lift board to provide access to A8A2R3. Adjust for the 10 kHz sidebands to be 12 ±0.5 dB below the carrier.

k. Disconnect 10 kHz from MOD IN and connect power meter to RF OUTPUT. Readjust A3R8 to recalibrate at 0 dBm (-6 dBm with 183 Attenuator Option). Repeat steps g. through k.

l. Disconnect function generator and attach power meter to output of system. Set level VERNIER for +10 dB (+3 dB w/188 attenuator option) and adjust A3R3 for appropriate power. (make sure PM3602 is in CW position).

m. Set level VERNIER counter clockwise (0 or -5 dBm) and adjust A3R8 for appropriate power.

n. Repeat steps l. and m. until both conditions are met.

o. Reattach function generator. (Turn PM3602 to AM.) Set level VERNIER for +5 dBm or +10 dBm and adjust A3R4 for 12 dB sidebands as in step i.

p. Set level VERNIER fully counterclockwise and adjust A8R3 for 12 dB sidebands as in step j.

q. Repeat steps o. and p. until both conditions are met.

r. Repeat steps l, m, n, o, p, until all conditions are satisfied.

4-88. MODULATION SENSITIVITY. This adjustment sets the AM modulation sensitivity to 0.5 V rms for 50 percent modulation. This adjustment can be performed with the plug-in installed in the mainframe and the right side panel removed.

a. Remove the right side panel.

b. Set Frequency Select switches to 1.0 GHz. Connect a spectrum analyzer to the RF OUTPUT. Set spectrum analyzer to 1.0 GHz center frequency, 10 kHz/cm, and use the 1 kHz IF bandwidth.

c. Connect a source of a 10 kHz sinewave at a level of 0.5 V rms to the MOD IN connector on the front panel. With PM3602 AM/FM/ØM modulator, set controls for AM, external source. Adjust level of 10 kHz sinewave to 1.0 V rms, and MOD LEVEL control fully cw. Meter should read full scale. If not refer to paragraph 4-50 of PM3602 manual. Set the front panel RF Level VERNIER control for +7 dBm.

d. With a PM3601 modulator, adjust A3R4 for the 10 kHz sidebands to be 12 dB below the carrier. With a PM3602 modulator, set MOD LEVEL control for 50% meter reading. Adjust A3R4 for the 10 kHz sidebands to be 12 dB below the carrier.

4-89. VHF OSCILLATOR. This procedure is used to set the nominal frequencies of VHF oscillator A5. This adjustment is performed with the plug-in unit connected to the mainframe with extender cable 298822.

a. Connect RF plug-in to mainframe with extender cable 298822.
b. Connect A5J1 to the prescaler input and the prescaler output to the frequency counter input. Set prescaler to divide by 10 mode.
c. Set the mainframe front panel 100 MHz and 10 MHz switches as shown in Table 4-7.
d. Set oscillator frequencies to within 500 kHz of nominal, preferably on high side, since ageing characteristics normally cause decreasing frequency.

4-90. FILTERS AND MULTIPLIERS. There are four stripline bandpass filters and two multipliers in the RF plug-in. These are incorporated in various units including amplifiers, mixers, etc. All of the filters are synchronously tuned for minimum insertion loss across the band. The minimum 3 dB bandwidth of each filter is summarized below:

REFERENCE DESIGNATOR	UNIT NAME	MINIMUM 3 dB BANDWIDTH
A2	365 MHz Filter Amplifier (two filters)	3 MHz
A4	395-405 MHz Filter Amplifier	12 MHz
A6	610-710 MHz Fitler Converter	110 MHz

4-91. These can be adjusted in the system with the plug-in unit connected with extender cable 299882, using adapter cables which are part of the Service Kit (299252). Any amplifier on the filter inputs or outputs can be peaked up using the same setup. When adjusting the filters in the system, the following procedures should be followed:

4-92. 365 MHz Filter Amplifier A2. Set frequency of synthesizer to 45.0000000 MHz. Check that A5 is adjusted to specifications (paragraph 4-89). Connect A2J2 to a spectrum analyzer and tune to 390 MHz. There will be three signals present. The center one is the 355 MHz LO leakage of the output mixer and the signal 35 MHz above that is the signal of interest. Adjust filter tuning capacitors to maximize the center signal. Switch front panel from 45 to 5, 15, 25, 35, 650, 750, and 850 MHz. The upper signal should remain at the same level. The level should be -21 dBm minimum. If it is not, refer to troubleshooting chart Figure 4-2 for further information.

4-93. 395-405 MHz Filter Amplifier A4. Connect A4J2 to a spectrum analyzer. As the synthesizer frequency is switched from 30.000 to 39.999 MHz the signal at A4J2 will vary from 395 to 404.999 MHz ± VHF oscillator frequency error from 365 MHz. The filter capacitors can be tuned for maximum power out of either jack across this band. The level should be between 0 to +3 dBm across the band.

4-94. 610-710 MHz Filter Converter A6. Connect A6J1 to a spectrum analyzer and tune to 660 MHz. Set scan width to 30 MHz/cm. Only 6 discrete frequencies pass through this filter 610, 630, 650, 670, 690, and 710 MHz. These are present at the output of A5 when the synthesizer is programmed to 900, 800, 700, 600, 500, and 400 MHz, respectively. Set synthesizer to 600 MHz and adjust tuning slugs for maximum signal level on the spectrum analyzer. Then sequence synthesizer from 400 to 900 MHz maximizing the signal level across the band for best flatness and power output. The level at the output should be at -15 ±3 dBm. If it is not, refer to the trouble-shooting chart Figure 4-2 for further information.

4-95. MULTIPLIER SECTION A7.

4-96. X10 Multiplier Section A7A1/2.

a. Swing open logic board by removing (3) screws. Unfasten A7 and rest on top of plug-in, X10 side up. Remove cover.

b. Set a reference level of +20 dBm on spectrum analyzer and tune to 4000 MHz with a scan width of 30 MHz/cm. Connect to A7J5.

c. Switching the synthesizer across the band 30.00 to 39.999 MHz will cause the signal at J5 to vary from 3950 to 4050 MHz. Adjust A7A2C4 and R1 for maximum power and lowest ripple. Adjust A7A1C20 for best response. The power should be +17 ±3 dBm for all frequencies. Replace cover.

4-97. X5 Multiplier Section A7A3/4.

a. Rest A7 on top of plug-in with X5 side up. Remove cover.

b. Set a reference level of -10 dBm on a spectrum analyzer and tune to 660 MHz with scan width at 100 MHz/cm. Connect analyzer to A7J2.

c. Set synthesizer as in paragraph 4-94 to 900, 800, 700, 600, 500, and 400 MHz. The output at J2 should step in 100 MHz increments from 3050 to 3550 MHz. Adjust C6 and R2 for minimum variation of signal levels, and a minimum power output of -16 dBm. Replace cover.

TABLE 4-7. VHF OSCILLATOR FREQUENCIES

MAINFRAME SWITCH SETTINGS		NOMINAL FREQUENCY	ADJUST ON A5A1
100 MHz	10 MHz		
Digit	Digit		
9	3	305 MHz	C64
8	3	315 MHz	C59
7	3	325 MHz	C60
6	3	335 MHz	C63
5	3	345 MHz	C62
4	3	355 MHz	C61
0	3	365 MHz	C68
0	2	375 MHz	C67
0	1	385 MHz	C66
0	0	395 MHz	C65

4-98. OUTPUT SECTION A8.

4-99. Frequency Scaler A8A1.

a. Remove RF plug-in and connect to mainframe with the extender cable. Remove cover from A8A1. Remove frequency doubler A8X1 from socket, and connect a power meter to socket pin L, using a coaxial pigtail connection.

b. Adjust A8A1R87 for a minimum power of +12 dBm for synthesizer frequencies from 1000 to 1999 MHz. Replace doubler and cover.

4-100. Output Amplifier A8A2. For adjustment of this board refer to paragraph 4-87.

SECTION 5

REPLACEABLE PARTS LIST

5-1. INTRODUCTION

5-2. This section contains the replaceable parts list for the P3602.0E1 RF Section. The parts list Table 5-1 is presented in reference designation order. The parts list contains the reference designation, AILTECH part number, quantity, description, manufacturers code, and manufacturers part number. Table 5-2 lists the manufacturers code and the manufacturers name and address.

TABLE 5-1. REPLACEABLE PARTS LIST

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1	295914-2	1	RF SECTION, PLUG-IN P3602.0E1	56872	295914-2
1A1	295531	1	10-60 MHz COMB GENERATOR ASSEMBLY	56872	295531
1A2	298972-2	1	365 MHz FILTER AMPLIFIER ASSEMBLY	56872	298972-2
1A3	296754-1	1	LEVEL REFERENCE PC BOARD	56872	296754-1
1A4	298971-3	1	395-405 MHz FILTER AMPLIFIER ASSEMBLY	56872	298971-3
1A5	295529	1	VHF OSCILLATOR ASSEMBLY	56872	295529
1A6	295511-1	1	610-710 MHz FILTER CONVERTER ASSEMBLY	56872	295511-1
1A7	295536	1	MULTIPLIER SECTION ASSEMBLY	56872	295536
1A8	295530	1	OUTPUT ASSEMBLY	56872	295530
1A9	295319-4	1	LOGIC CONVERTER	56872	295319-4
1A10	295459-2	1	PLUG-IN PANEL	56872	295469-2
1A11	299292	1	PLUG-IN POWER DISTRIBUTION	56872	299292
1A12	295599	1	ATTENUATOR (182 AND 183 OPTIONS)	56872	295599
1A13	295683	1	ATTENUATOR CONTROL BOARD (183 OPTION ONLY)	56872	295683
1A14			NOT USED		
1A15	296356-1	1	MIXER	56872	296356-1
1A16	295687-2	1	LOW PASS FILTER, 2 GHz	56872	295687-2
1A17	295617	1	BANDPASS FILTER, 3300 MHz	56872	295617
1A18	295644	1	BANDPASS FILTER, 4000 MHz	56872	295644
1A19	295686	1	LOW PASS FILTER, 4100 MHz	56872	295686
1A20	295940-1	1	LOW PASS FILTER, 4500 MHz	56872	295940-1
1W1	299297-30	1	CABLE ASSEMBLY, COAXIAL	56872	299297-30
1W2	299297-31	1	CABLE ASSEMBLY, COAXIAL	56872	299297-31
1W3	299297-32	1	CABLE ASSEMBLY, COAXIAL	56872	299297-32
1W4	299297-33	1	CABLE ASSEMBLY, COAXIAL	56872	299297-33
1W5	299297-34	1	CABLE ASSEMBLY, COAXIAL	56872	299297-34
1W6	299297-62	1	CABLE ASSEMBLY, COAXIAL	56872	299297-62
1W7	299297-64	1	CABLE ASSEMBLY, COAXIAL	56872	299297-64
1W8	299297-37	1	CABLE ASSEMBLY, COAXIAL	56872	299297-37
1W9	299297-63	1	CABLE ASSEMBLY, COAXIAL	56872	299297-63
1W10	299297-68	1	CABLE ASSEMBLY, COAXIAL	56872	299297-68
1W11	299297-65	1	CABLE ASSEMBLY, COAXIAL	56872	299297-65
1W12	299297-66	1	CABLE ASSEMBLY, COAXIAL	56872	299297-66
1W13	299297-42	1	CABLE ASSEMBLY, COAXIAL	56872	299297-42
1W14	299297-43	1	CABLE ASSEMBLY, COAXIAL	56872	299297-43
1W15	299297-45	1	CABLE ASSEMBLY, COAXIAL	56872	299297-45
1W16	295465	1	CABLE ASSEMBLY, COAXIAL	56872	295465

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1W17	295466	1	CABLE ASSEMBLY, COAXIAL	56872	295466
1W18	295946	1	CABLE ASSEMBLY, COAXIAL	56872	295946
1W19	295468	1	CABLE ASSEMBLY, COAXIAL	56872	295468
1W20	295464	1	CABLE ASSEMBLY, COAXIAL	56872	295464
1W21	299297-67	1	CABLE ASSEMBLY, COAXIAL	56872	299297-67
1A1	295331	1	10-60 MHz COMB GENERATOR ASSEMBLY	56872	295531
A1	295620	1	10-60 MHz COMB GENERATOR PC BOARD	56872	295620
A2	298986	1	COMB CONVERTER PC BOARD	56872	298986
FL1	293608	6	FILTER CONNECTOR	72982	1201-066
FL2	293608		FILTER CONNECTOR	72982	1201-066
FL3	293608		FILTER CONNECTOR	72982	1201-066
FL4	293608		FILTER CONNECTOR	72982	1201-066
FL5	293608		FILTER CONNECTOR	72982	1201-066
FL6	293608		FILTER CONNECTOR	72982	1201-066
J2	299234	2	CONNECTOR, RIGHT ANGLE	98291	51-047-0000
J3	299234		CONNECTOR, RIGHT ANGLE	98291	51-047-0000
1A1A1	295620	1	10 TO 60 MHz COMB GENERATOR BOARD	56872	295620
C1			NOT USED		
C2			NOT USED		
C3			NOT USED		
C4	299243-1	11	CAPACITOR .001 uF	56289	CK60AW102M
C5	299244-1	8	CAPACITOR .01 uF	56289	5HKS-S10
C6	299244-1		CAPACITOR .01 uF	56289	5HKS-S10
C7	299250-241	2	CAPACITOR, 240 pF	14655	CM04FD241J03
C8	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C9	299244-1		CAPACITOR, .01 uF	56289	5HKS-S10
C10	299244-1		CAPACITOR, .01 uF	56289	5HKS-S10
C11			NOT USED		
C12	299241-680	2	CAPACITOR, .68 pF	72136	DM5-680J
C13			NOT USED		
C14	299241-100	1	CAPACITOR, 10 pF	72136	DM5-100J
C15	299241-820	2	CAPACITOR, 82 pF	72136	DM5-820J
C16	299250-241		CAPACITOR, 240 pF	14655	CM04FD241J03
C17	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C18	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C19	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C20			NOT USED		
C21	299244-1		CAPACITOR, .01 uF	56289	5HKS-S10
C22	299244-1		CAPACITOR, .01 uF	56289	5HKS-S10
C23	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C24	299241-680		CAPACITOR, 68 pF	72136	DM5-680J
C25			NOT USED		
C26	299241-050	1	CAPACITOR, 5 pF	72136	DM5-050D
C27	299241-820		CAPACITOR, 82 pF	72136	DM5-820J03
C28	299250-301	2	CAPACITOR, 300 pF	14655	CM04FC301J
C29	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C30	299250-301		CAPACITOR, 300 pF	14655	CM04FC301J03
C31			NOT USED		
C32			NOT USED		
C33			NOT USED		
C34			NOT USED		
C35	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C36	299240-1	2	CAPACITOR, 6.8 uF	31433	T368B685MD35AS
C37	299244-1		CAPACITOR, .01 uF	56289	5HKS-S10
C38			NOT USED		
C39			NOT USED		
C40			NOT USED		
C41	299240-1		CAPACITOR, 6.8 uF	31433	T368B685MD35AS
C42	299241-1		CAPACITOR, .01 uF	56289	5HKS-S10

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A1A1C43	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C44	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C45	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
CR1			NOT USED		
CR2	299251-1	5	DIODE	72314	1N4009
CR3	299251-1		DIODE	72314	1N4009
CR4	299251-1		DIODE	72314	1N4009
CR5	299251-1		DIODE	72314	1N4009
CR6	299251-1		DIODE	72314	1N4009
E1	293306	7	TERMINAL, SOLDER	71279	1019-2-901
E2	293306		TERMINAL, SOLDER	71279	1019-2-901
E3	293306		TERMINAL, SOLDER	71279	1019-2-901
E4	293306		TERMINAL, SOLDER	71279	1019-2-901
E5	293306		TERMINAL, SOLDER	71279	1019-2-901
E6	293306		TERMINAL, SOLDER	71279	1019-2-901
E7	293306		TERMINAL, SOLDER	71279	1019-2-901
J1	299235-1	1	CONNECTOR, RIGHT ANGLE	98291	51-353-0000
L1			NOT USED		
L2			NOT USED		
L3	299237-20	1	INDUCTOR, 1.0 uH	99800	1025-020
L4			INDUCTOR P/O PC BOARD		
L5			NOT USED		
L6	299237-52	9	INDUCTOR, 22 uH, ±10%	99800	1025-052
L7	231105-4	3	INDUCTOR, VARIABLE, .9 uH	56872	231105-4
L8	231105-4		INDUCTOR, VARIABLE, .9 uH	56872	231105-4
L9			NOT USED		
L10			NOT USED		
L11	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L12	231105-3	2	INDUCTOR, VARIABLE, .44 uH	56872	231105-3
L13	231105-3		INDUCTOR, VARIABLE, .44 uH	56872	231105-3
L14	231105-4		INDUCTOR, VARIABLE, .9 uH	56872	231105-4
L15			NOT USED		
L16			NOT USED		
L17			NOT USED		
L18	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L19	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L20	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L21	299237-38	2	INDUCTOR, 5.6 uH	99800	1025-038
L22	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L23	299237-38		INDUCTOR, 5.6 uH	99800	1025-038
L24	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L25	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L26	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
L27	299237-52		INDUCTOR, 22 uH, ±10%	99800	1025-052
M1	231104-1	1	MIXER	15542	SRA-1
R1			NOT USED		
R2			NOT USED		
R3			NOT USED		
R4	299701-470	3	RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R5	299701-102	3	RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R6	299701-242	1	RESISTOR, 2.4 K, 1/4 W	01121	RC07GF242J
R7	299701-471	2	RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R8			NOT USED		
R9	299701-103	6	RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R10	299701-102		RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R11	299701-301	1	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R12			NOT USED		
R13			NOT USED		
R14	299701-471		RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R15	299701-180	1	RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R16	299701-470		RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R17			NOT USED		

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A1A1R18			NOT USED		
R19			NOT USED		
R20	299701-201	3	RESISTOR, 200 Ω, 1/4 W	01121	RC07GF201J
R21	299701-152	8	RESISTOR, 1.5K, 1/4 W	01121	RC07GF152
R22	299701-152		NOT USED		
R23			NOT USED		
R24	299701-470		RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R25	294746	1	RESISTOR, VARIABLE, 100 Ω	80294	3339P-1-101
R26	299701-161		RESISTOR, 160 Ω, 1/4 W	01121	RC07GF161J
R27	299701-161		RESISTOR, 160 Ω, 1/4 W	01121	RC07GF161J
R28	299701-680	1	RESISTOR, 68 Ω, 1/4 W	01121	RC07GF680J
R29			NOT USED		
R30			NOT USED		
R31	299701-472	8	RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R32	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R33	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R34			NOT USED		
R35	299701-101	3	RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R36	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R37	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R38	299701-101		RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R39	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R40	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R41	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R42	299701-101		RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R43	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R44	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R45	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R46	299701-201		RESISTOR, 200 Ω, 1/4 W	01121	RC07GF201J
R47	299701-102		RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R48	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R49	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R50	299701-562	1	RESISTOR, 5.6 K, 1/4 W	01121	RC07GF562J
R51	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R52	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R53	299701-681	1	RESISTOR, 680 Ω, 1/4 W	01121	RC07GF681J
R54	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R55	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R56	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R57	299701-201		RESISTOR, 200 Ω, 1/4 W	01121	RC07GF201J
R58	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R59	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
Q1			NOT USED		
Q2	294151	3	TRANSISTOR, NPN	04713	2N4124
Q3	294151		TRANSISTOR, NPN	04713	2N4124
Q4			NOT USED		
Q5	294151		TRANSISTOR, NPN	04713	2N4124
Q6			NOT USED		
Q7	299255	7	TRANSISTOR, PNP	04713	2N4126
Q8	299255		TRANSISTOR, PNP	04713	2N4126
Q9	299255		TRANSISTOR, PNP	04713	2N4126
Q10	299255		TRANSISTOR, PNP	04713	2N4126
Q11	299255		TRANSISTOR, PNP	04713	2N4126
Q12	299255		TRANSISTOR, PNP	04713	2N4126
Q13	299255		TRANSISTOR, PNP	04713	2N4126
U1	299501	1	INTEGRATED CIRCUIT	01295	SN7442N
U2	293361	2	INTEGRATED CIRCUIT	01295	SN7408N
U3	293361		INTEGRATED CIRCUIT	01295	SN7408N
XU1	294567	1	SOCKET, IC, 16 PIN	01295	C931610
XU2	294573	2	SOCKET, IC, 14 PIN	01295	C931410
XU3	294573		SOCKET, IC, 14 PIN	01295	C931410

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A1A2	298986	1	COMB CONVERTER PC BOARD	56872	298986
C1	299241-360	2	CAPACITOR, 36 pF	72136	DM5-360J
C2	299250-101	2	CAPACITOR, 100 pF	14655	CM04FD101J03
C3	299250-101		CAPACITOR, 100 pF	14655	CM04FD101J03
C4	299241-360		CAPACITOR, 36 pF	72136	DM5-360J
L1	299237-000	3	INDUCTOR, .15 uH	99800	1025-00
L2	299237-000		INDUCTOR, .15 uH	99800	1025-00
L3	299237-000		INDUCTOR, .15 uH	99800	1025-00
M1	231104-1	1	MIXER	15542	SRA-1
1A2	298972-2	1	365 MHz FILTER AMPLIFIER ASSEMBLY	56872	298972-2
C1	295374	10	CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C2	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C3	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C4	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C5	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C6	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C7	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C8	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C9	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C10	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
FL1	293608	1	FILTER CONNECTOR	72982	1201-066
J1	299233	2	CONNECTOR, RF BULKHEAD	98291	51-045-0000
J2	299234	1	CONNECTOR, RIGHT ANGLE	98291	51-047-0000
J3	299233		CONNECTOR, RF BULKHEAD	98291	51-045-0000
1A2A1	298965-2	1	365 MHz INPUT PC BOARD	56872	298965-2
C1	293746	2	CAPACITOR, VARIABLE 2-8 pF	72982	538-011-A-2-8
C2	299243-1	4	CAPACITOR, .001 uF	56872	CK60AW102M
C3	299243-1		CAPACITOR, .001 uF	56872	CK60AW102M
C4	299243-1		CAPACITOR, .001 uF	56872	CK60AW102M
C5	299243-1		CAPACITOR, .001 uF	56872	CK60AW102M
C6	293746		CAPACITOR, VARIABLE, 2-8 pF	56872	538-011-A-2-8
E1	293306	3	TERMINAL	71279	1019-2-901
E2	293306		TERMINAL	71279	1019-2-901
E3	293306		TERMINAL	71279	1019-2-901
L1	299237-12	2	RF COIL, MOLDED, .47 uH	99800	1025-012
L2	299237-12		RF COIL, MOLDED, .47 uH	99800	1025-012
Q1	299239-1	1	TRANSISTOR	04713	2N5179
R1	299701-822	2	RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R2	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R3	299701-102	1	RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R4	299701-180	1	RESISTOR, 18 Ω, 1/4 W, 5%	01121	RC07GF180J
1A2A3	298993-2	1	365 MHz BUFFER PC BOARD	56872	298993-2
C1	299243-1	7	CAPACITOR, .001 pF	56289	CK60AW102M
C2	293746	2	CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C3	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
C4	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
C5	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
C6	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
C7	293746		CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C8			NOT USED		
C9	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
C10	299243-1		CAPACITOR, .001 pF	56289	CK60AW102M
E1	293310	4	TERMINAL	71279	1597-2-01
E2	293310		TERMINAL	71279	1597-2-01
E3	293310		TERMINAL	71279	1597-2-01
E4	293310		TERMINAL	71279	1597-2-01
L1	299237-12	4	INDUCTOR, .47 uH	99800	1025-012
L2	299237-12		INDUCTOR, .47 uH	99800	1025-012
L3	299237-12		INDUCTOR, .47 uH	99800	1025-012
L4	299237-12		INDUCTOR, .47 uH	99800	1025-012

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A2A3Q1	299239-1	2	TRANSISTOR	04713	2N5179
Q2	299239-1		TRANSISTOR	04713	2N5179
R1	299701-180	1	RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R2	299701-822	4	RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R3	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R4	299701-152	1	RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R5	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R7	299701-102	1	RESISTOR, 1K, 1/4 W	01121	RC07GF102J
1A2A5	298983-2	1	365 MHz OUTPUT CONVERTER PC BOARD	56872	298983-2
C1	299243-1	10	CAPACITOR, .001 uF	56289	CK60AW102M
C2	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C3	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C4			NOT USED		
C5	293746	3	CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C6	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C7	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C8	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C9			NOT USED		
C10	293746		CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C11	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C12	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C13	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C14			NOT USED		
C15	293746		CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C16	299241-050	1	CAPACITOR, 5 pF	72136	DM5-050D
C17	299241-080	2	CAPACITOR, 8 pF	72136	DM5-080D
C18	299241-080		CAPACITOR, 8 pF	72136	DM5-080D
C19	299250-301	4	CAPACITOR, 300 pF	14655	CM04FC301J03
C20	299250-301		CAPACITOR, 300 pF	14655	CM04FC301J03
C21	299241-120	1	CAPACITOR, 12 pF	72136	DM5-120J
C22	299250-301		CAPACITOR, 300 pF	14655	CM04FC301J03
C23	299250-301		CAPACITOR, 300 pF	14655	CM04FC301J03
C24	299240-1	1	CAPACITOR, 6.8 uF	31433	T368B685M035AS
C25	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
E1	293310	5	TERMINAL	71279	1597-2-01
E2	293310		TERMINAL	71279	1597-2-01
E3	293310		TERMINAL	71279	1597-2-01
E4	293310		TERMINAL	71279	1597-2-01
E5	293310		TERMINAL	71279	1597-2-01
L1			NOT USED		
L2			NOT USED		
L3			INDUCTOR PART OF PWB		
L4			INDUCTOR PART OF PWB		
L5			INDUCTOR PART OF PWB		
L6	299237-08	2	INDUCTOR, .33 uH	99800	1025-08
L7	299237-08		INDUCTOR, .33 uH	99800	1025-08
L8	231105-1	2	INDUCTOR, VARIABLE, .133 uH	56872	231105-1
L9	231105-5	1	INDUCTOR, VARIABLE, 2 uH	56872	231105-5
L10	231105-1		INDUCTOR, VARIABLE, .133 uH	56872	231105-1
M1	231104-4	1	MIXER	15542	SRA-1
Q1	299239-1	3	TRANSISTOR	04713	2N5179
Q2	299239-1		TRANSISTOR	04713	2N5179
Q3	299239-1		TRANSISTOR	04713	2N5179
R1	299701-180	3	RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R2	299701-472	6	RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R3	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R4	299701-102	3	RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R5	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R6	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R7	299701-102		RESISTOR, 1K, 1/4 W	01121	RC07GF102J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A2A5R8	299701-472		RESISTOR, 4.7K, 1/4 W	01121	RC07GF472J
R9	299701-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
R10	299701-102		RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R11	299701-301	4	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R12	299701-180		RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R13	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R14	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R15	299701-180		RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R16	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R17	299701-161	1	RESISTOR, 160 Ω, 1/4 W	01121	RC07GF161F
R18	299701-470	1	RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
1A3	296754-1	1	LEVEL REFERENCE/DECODER PC BOARD	56872	296754-1
C1	299240-1	3	CAPACITOR, 6.8 uF	31433	T368B685M035AS
C2	299240-1		CAPACITOR, 6.8 uF	31433	T368B685M035AS
C3	299240-1		CAPACITOR, 6.8 uF	31433	T368B685M035AS
CR1	293203-1	1	DIODE, ZENER	04713	1N753A
R1	299701-471	1	RESISTOR, 470 Ω, 1/4 W, 5%	01121	RC07GF471J
R2	299700-242	1	RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R3	296751-2	2	RESISTOR, VARIABLE, 1K	80294	3299P-1-102
R4	296751-2		RESISTOR, VARIABLE, 1K	80294	3299P-1-102
R5	299700-103	1	RESISTOR, 10 K, 1/4 W, 5%	01121	RC07GF103J
R6	299700-472	1	RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R7	299700-301	1	RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R8	296751-1	1	RESISTOR, VARIABLE, 500 Ω	80294	3299P-1-501
R9	299700-302	1	RESISTOR, 3 K, 1/8 W, 5%	01121	RC05GF302J
R10	299700-682	1	RESISTOR, 6.8 K, 1/8 W, 5%	01121	RC05GF682J
U1	293484-1	1	INTEGRATED CIRCUIT	72314	UA747CA
U2			NOT USED		
U3	293522-1	1	INTEGRATED CIRCUIT (USED ON 183 OPTION ONLY)	34371	HD0165-5
XU1	294573-1	1	SOCKET, IC, 14 PIN	01295	C931410
XU3	294566-1	1	SOCKET, IC, 24 PIN	01295	C932410
1A4	298971-3	1	395-405 MHz FILTER AMPLIFIER ASSEMBLY	56872	298971-3
C1	295374	7	CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C2	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C3	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C4	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C5	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C6	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
C7	295374		CAPACITOR, VARIABLE, 0.8-10 pF	72982	E5201
FL1	293608	1	FILTER CONNECTOR	72982	1201-066
J1	299234	2	CONNECTOR, RT ANGLE BULKHEAD	98291	51-047-0000
J2	299234		CONNECTOR, RT ANGLE BULKHEAD	98291	51-047-0000
1A4A1	298981	1	395-405 MHz INPUT PC BOARD	56872	298981
C1	299243-1	6	CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
C2	293746	2	CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C3	299243-1		CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
C4	299243-1		CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
C5	299243-1		CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
C6	299243-1		CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
C7	293746		CAPACITOR, VARIABLE, 2-8 pF	72982	538-011-A-2-8
C8	299243-1		CAPACITOR, CERAMIC, .001 uF	56289	CK60AW102M
E1	293310	2	TERMINAL	71279	1597-2-01
E2	293310		TERMINAL	71279	1597-2-01
L1	299237-12	2	INDUCTOR, FIXED, .47 uH	99800	1025-012
L2	299237-12		INDUCTOR, FIXED, .47 uH	99800	1025-012
Q1	299239-1	2	TRANSISTOR	04713	2N5179
Q2	299239-1		TRANSISTOR	04713	2N5179
R1	299701-180	2	RESISTOR, 18 Ω, 1/4, 5%	01121	RC07GF180J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A4A1R2	299701-822	4	RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R3	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R4	299701-681	2	RESISTOR, 680 Ω, 1/4 W, 5%	01121	RC07GF681J
R5	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R7	299701-681		RESISTOR, 680 Ω, 1/4 W, 5%	01121	RC07GF301J
R8	299701-301	1	RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R9	299701-180		RESISTOR, 18 Ω, 1/4 W, 5%	01121	RC07GF180J
1A4A2	298979-2	1	395-405 MHz OUTPUT PC BOARD	56872	298979-2
C1	299243-1	5	CAPACITOR, .001 uF	56289	CK60AW102M
C2	293916	2	CAPACITOR, VARIABLE, 3-10 pF	91293	9352
C3	299245-2	2	CAPACITOR, .01 uF	72982	8121-M058-651-103M
C4	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C5	299245-2		CAPACITOR, .01 uF	72982	8121-M058-651-103M
C6	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C7	293916		CAPACITOR, VARIABLE, 3-10 pF	91293	9352
C8	299240-1	1	CAPACITOR, ELEC., 6.8 uF	31433	T368B685M035AS
C9	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C10	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
E1			TERMINAL P/O PWB		
E2	293310	1	TERMINAL	71279	1597-2-01
E3	293306	1	TERMINAL	71279	1019-2-901
E4			TERMINAL P/O PWB		
E5			TERMINAL P/O PWB		
L1	299237-12	4	COIL, RF, MOLDED, .47 uH	99800	1025-012
L2	299237-12		COIL, RF, MOLDED, .47 uH	99800	1025-012
L3	299237-12		COIL, RF, MOLDED, .47 uH	99800	1025-012
Q1	299239-1	2	TRANSISTOR	04713	2N5179
Q2	299239-1		TRANSISTOR	04713	2N5179
R1	299701-180	2	RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R2	299701-822	4	RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R3	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R4	299701-152	1	RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R5	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R7	299701-102	1	RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R8	299701-180		RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R9	299701-301	2	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R10	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
1A5	295529	1	VHF OSCILLATOR ASSEMBLY	56872	295529
FL1	293609	8	FILTER CONNECTOR	72982	1201-066
FL2	293609		FILTER CONNECTOR	72982	1201-066
FL3	293609		FILTER CONNECTOR	72982	1201-066
FL4	293609		FILTER CONNECTOR	72982	1201-066
FL5	293609		FILTER CONNECTOR	72982	1201-066
FL6	293609		FILTER CONNECTOR	72982	1201-066
FL7	293609		FILTER CONNECTOR	72982	1201-066
FL8	293609		FILTER CONNECTOR	72982	1201-066
J1	299234	3	CONNECTOR, RIGHT ANGLE	98291	51-047-0000
J2	299234		CONNECTOR, RIGHT ANGLE	98291	51-047-0000
J3	299234		CONNECTOR, RIGHT ANGLE	98291	51-047-0000
1A5A1	295596	1	VHF OSCILLATOR PC BOARD	56872	295596
C1			NOT USED		
C2	299245-4	23	CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C3	299253-1	9	CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C4	299241-120	2	CAPACITOR, 12 pF	72136	DM5CC-120J
C5			NOT USED		
C6			NOT USED		
C7	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A1C8	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C9	299241-120		CAPACITOR, 12 pF	72136	DM5CC-120J
C10			NOT USED		
C11			NOT USED		
C12	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C13	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C14	299241-100	8	CAPACITOR, 10 pF	72136	DM5-100J
C15			NOT USED		
C16			NOT USED		
C17	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C18	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C19	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C20			NOT USED		
C21			NOT USED		
C22	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C23	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C24	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C25			NOT USED		
C26			NOT USED		
C27	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C28	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C29	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C30			NOT USED		
C31			NOT USED		
C32	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C33	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C34	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C35			NOT USED		
C36			NOT USED		
C37	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C38	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C39	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C40			NOT USED		
C41			NOT USED		
C42	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C43	299253-1		CAPACITOR, 2.7 pF	95275	VY10CA2R7DER
C44	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C45			NOT USED		
C46	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C47	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C48	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C49	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C50	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C51	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C52	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C53	299240-1	1	CAPACITOR, 6.8 uF	31433	T368B685M035AS
C54	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C55	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C56	299240-2	1	CAPACITOR, 22 uF	31433	T368B226M115AS
C57	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C58	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C59	293593	10	CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C60	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C61	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C62	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C63	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C64	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C65	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C66	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C67	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C68	293593		CAPACITOR, VARIABLE 1-10 pF	91293	8090-B
C69	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A1C70			NOT USED		
C71	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C72	299253-4		CAPACITOR, 5.1 pF	95275	VY10CA5R1DER
C73	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C74	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
E1	293311	12	TERMINAL	71279	1597-4-01
E2	293311		TERMINAL	71279	1597-4-01
E3	293311		TERMINAL	71279	1597-4-01
E4	293311		TERMINAL	71279	1597-4-01
E5	293311		TERMINAL	71279	1597-4-01
E6	293311		TERMINAL	71279	1597-4-01
E7	293311		TERMINAL	71279	1597-4-01
E8	293311		TERMINAL	71279	1597-4-01
E9	293311		TERMINAL	71279	1597-4-01
E10	293311		TERMINAL	71279	1597-4-01
E11	293311		TERMINAL	71279	1597-4-01
E12	293311		TERMINAL	71279	1597-4-01
L1	299237-08	11	INDUCTOR, .33 uH	99800	1025-08
L2	299237-08		INDUCTOR, .33 uH	99800	1025-08
L3	299237-08		INDUCTOR, .33 uH	99800	1025-08
L4			NOT USED		
L5	299237-08		INDUCTOR, .33 uH	99800	1025-08
L6	299237-08		INDUCTOR, .33 uH	99800	1025-08
L7	299237-08		INDUCTOR, .33 uH	99800	1025-08
L8	299237-08		INDUCTOR, .33 uH	99800	1025-08
L9	299237-08		INDUCTOR, .33 uH	99800	1025-08
L10	299237-08		INDUCTOR, .33 uH	99800	1025-08
L11	299237-08		INDUCTOR, .33 uH	99800	1025-08
L12	299237-08		INDUCTOR, .33 uH	99800	1025-08
Q1	294153	10	TRANSISTOR	04713	2N4126
Q2	299239-1	12	TRANSISTOR	04713	2N5179
Q3	294153		TRANSISTOR	04713	2N4126
Q4	299239-1		TRANSISTOR	04713	2N5179
Q5	294153		TRANSISTOR	04713	2N4126
Q6	299239-1		TRANSISTOR	04713	2N5179
Q7	294153		TRANSISTOR	04713	2N4126
Q8	299239-1		TRANSISTOR	04713	2N5179
Q9	294153		TRANSISTOR	04713	2N4126
Q10	299239-1		TRANSISTOR	04713	2N5179
Q11	294153		TRANSISTOR	04713	2N4126
Q12	299239-1		TRANSISTOR	04713	2N5179
Q13	294153		TRANSISTOR	04713	2N4126
Q14	299239-1		TRANSISTOR	04713	2N5179
Q15	294153		TRANSISTOR	04713	2N4126
Q16	299239-1		TRANSISTOR	04713	2N5179
Q17	294153		TRANSISTOR	04713	2N4126
Q18	299239-1		TRANSISTOR	04713	2N5179
Q19	299239-1		TRANSISTOR	04713	2N5179
Q20	299239-1		TRANSISTOR	04713	2N5179
Q21	294153		TRANSISTOR	04713	2N4126
Q22	299239-1		TRANSISTOR	04713	2N5179
R1	299701-152	10	RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R2	299701-472	22	RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R3	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R4	299701-242	10	RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R5	299701-471	10	RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R6	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R7	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R8	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R9	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R10	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R11	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R12	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A1R13	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R14	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R15	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R16	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R17	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R18	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R19	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R20	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R21	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R22	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R23	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R24	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R25	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R26	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R27	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R28	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R29	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R30	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R31	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R32	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R33	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R34	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R35	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R36	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R37	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R38	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R39	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R40	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R41	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R42	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R43	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R44	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R45	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
R46	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R47	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R48			NOT USED		
R49	299701-102	2	RESISTOR, 1K, 1/4 W, ±5%	01121	RC07GF102J
R50			NOT USED		
R51	299701-301	2	RESISTOR, 300 Ω, 1/4 W, ±5%	01121	RC07GF301J
R52	299701-102		RESISTOR, 1K, 1/4 W, ±5%	01121	RC07GF102J
R53			NOT USED		
R54	299701-301		RESISTOR, 300 Ω, 1/4 W, ±5%	01121	RC07GF301J
R55			NOT USED		
R56	299701-101	1	RESISTOR, 100 Ω, 1/4 W, ±5%	01121	RC07GF101J
R57	299701-152		RESISTOR, 1.5 K, 1/4 W, ±5%	01121	RC07GF152J
R58	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R59	299701-472		RESISTOR, 4.7 K, 1/4 W, ±5%	01121	RC07GF472J
R60	299701-242		RESISTOR, 2.4 K, 1/4 W, ±5%	01121	RC07GF242J
R61	299701-471		RESISTOR, 470 Ω, 1/4 W, ±5%	01121	RC07GF471J
U1	293501	1	INTEGRATED CIRCUIT	01295	SN7442N
XU1	294567	1	INTEGRATED SOCKET, 16 PIN	01295	C931610
1A5A2	299264	1	305-395 MHz ISOLATOR/AMPLIFIER PC BOARD	56872	299264
C1	299243	7	CAPACITOR, .001 uF	56289	CK60AW102M
C2	299241-100	6	CAPACITOR, 10 pF	72136	DM5-100J
C3	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C4	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C5	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C6	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C7	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C8	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C9	299241-100		CAPACITOR, 10 pF	72136	DM5-100J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A2C10	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C11	299241-020	1	CAPACITOR, 2 pF	72136	DM5-020J
C12	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C13	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C14	299243		CAPACITOR, .001 uF	56289	CK60AW102M
E1	293306	2	TERMINAL	71279	1019-2-901
E2	293306		TERMINAL	71279	1019-2-901
L1	299237-12	2	INDUCTOR, .47 uH	99800	1025-012
L2	299237-12		INDUCTOR, .47 uH	99800	1025-012
L3	298899-5	3	INDUCTOR, .05 uH	56872	298899-005
L4	298899-5		INDUCTOR, .05 uH	56872	298899-005
L5	298899-5		INDUCTOR, .05 uH	56872	298899-005
L6	298899-2	2	INDUCTOR, .04 uH	56872	298899-002
L7	298899-1	1	INDUCTOR, .03 uH	56872	298899-001
L8	298899-2		INDUCTOR, .04 uH	56872	298899-002
Q1	299239-1	3	TRANSISTOR	04713	2N5179
Q2	299239-1		TRANSISTOR	04713	2N5179
Q3	299239-1		TRANSISTOR	04713	2N5179
R1	299701-100	1	RESISTOR, 10 Ω, 1/4 W	01121	RC07GF100J
R2	299701-301	1	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R3	299701-822	6	RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R4	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R5	299701-102	1	RESISTOR, 1 K, 1/4 W	01121	RC07GF102J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R7	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R8	299701-471	2	RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R9	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R10	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R11	299701-471		RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
1A5A3	298988	1	345-395 MHz SWITCHED ISOLATION AMPLIFIER PC BOARD	56872	298988
C1	299243	7	CAPACITOR, .001 uF	56289	CK60AW102M
C2	299241-100	6	CAPACITOR, 10 pF	72136	DM5-100J
C3	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C4	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C5	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C6	299250-391	1	CAPACITOR, 390 pF	14655	CM04FA391J03
C7	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C8	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C9	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C10	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C11	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C12	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C13	299241-020	1	CAPACITOR, 2 pF	72136	DM5-020D
C14	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C15	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
E1	293306	3	TERMINAL	71279	1019-2-901
E2	293306		TERMINAL	71279	1019-2-901
E3	293306		TERMINAL	71279	1019-2-901
L1	299237-12	5	INDUCTOR, .47 uH	99800	1025-012
L2	299237-12		INDUCTOR, .47 uH	99800	1025-012
L3	299237-12		INDUCTOR, .47 uH	99800	1025-012
L4	298899-5	2	INDUCTOR, .05 uH	56872	298899-005
L5	299237-12		INDUCTOR, .47 uH	99800	1025-012
L6	299237-12		INDUCTOR, .47 uH	99800	1025-012
L7	298899-5		INDUCTOR, .05 uH	56872	298899-005
L8	298899-6	1	INDUCTOR, .05 uH	56872	298899-005

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A3L9	298899-2	2	INDUCTOR, .04 uH	56872	298899-002
L10	298899-1	1	INDUCTOR, .03 uH	56872	298899-001
L11	298899-2		INDUCTOR, .04 uH	56872	298899-002
Q1	296746-001	3	TRANSISTOR	04713	MRF914
Q2	296746-001		TRANSISTOR	04713	MRF914
Q3	296746-001		TRANSISTOR	04713	MRF914
Q4	294153	1	TRANSISTOR	04713	2N4126
R1	299701-100	1	RESISTOR, 10 Ω, 1/4 W	01121	RC07GF100J
R2	299701-301	1	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R3	299701-822	6	RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R4	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R5	299701-102	2	RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R7	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R8	299701-471	2	RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R9	299701-102		RESISTOR, 1K, 1/4 W	01121	RC07GF102J
R10	299701-622	1	RESISTOR, 6.2 K, 1/4 W	01121	RC07GF622J
R11	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R12	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R13	299701-471		RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
1A5A4	298989-2	1	SWITCHED ISOLATOR DOUBLER PC BOARD	56872	298989-2
C1	299241-100	4	CAPACITOR, 10 pF	72136	DM5-100J
C2	299243	7	CAPACITOR, .001 uF	56289	CK60AW102M
C3	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C4	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C5	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C6	299250-391		CAPACITOR, 390 pF	14655	CM04FA391J03
C7	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C8	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C9	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C10	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C11	299243		CAPACITOR, .001 uF	56289	CK60AW102M
C12	293916	1	CAPACITOR, VARIABLE, 3-10 pF	91293	9352
C13	299241-100		CAPACITOR, 10 pF	72136	DM5-100J
C14	299241-010	2	CAPACITOR, 1 pF	72136	DM5-010D
C15	299241-010		CAPACITOR, 1 pF	72136	DM5-010D
E1	293306	3	TERMINAL	71279	1019-2-901
E2	293306		TERMINAL	71279	1019-2-901
E3	293306		TERMINAL	71279	1019-2-901
L1	299237-12	4	INDUCTOR, .47 uH	99800	1025-012
L2	299237-12		INDUCTOR, .47 uH	99800	1025-012
L3	299237-12		INDUCTOR, .47 uH	99800	1025-012
L4	298899-5	2	INDUCTOR, .05 uH	56872	298899-005
L5	299237-12		INDUCTOR, .47 uH	99800	1025-012
L6	298899-5		INDUCTOR, .05 uH	56872	298899-005
L7	298899-1	3	INDUCTOR, .03 uH	56872	298899-001
L8	298899-1		INDUCTOR, .03 uH	56872	298899-001
L9	298899-1		INDUCTOR, .03 uH	56872	298899-001
M1	231104-2	1	MIXER	21912	MD108
Q1	296746-001	3	TRANSISTOR	04713	MRF914
Q2	296746-001		TRANSISTOR	04713	MRF914
Q3	296746-001		TRANSISTOR	04713	MRF914
Q4	294153	1	TRANSISTOR	04713	2N4126
R1	299701-100	1	RESISTOR, 10 Ω, 1/4 W	01121	RC07GF100J
R2	299701-301	1	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R3	299701-822	6	RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R4	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R5	299701-102	2	RESISTOR, 1 K, 1/4 W	01121	RC07GF102J
R6	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R7	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R8	299701-102		RESISTOR, 1 K, 1/4 W	01121	RC07GF102J
R9	299701-471	2	RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A5A4R10	299701-622	1	RESISTOR, 6.2 K, 1/4 W	01121	RC07GF622J
R11	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R12	299701-822		RESISTOR, 8.2 K, 1/4 W	01121	RC07GF822J
R13	299701-471		RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R14	299701-100	1	RESISTOR, 10 Ω, 1/4 W	01121	RC07GF100J
R15	299701-431	2	RESISTOR, 430 Ω, 1/4 W	01121	RC07GF431J
R16	299701-431		RESISTOR, 430 Ω, 1/4 W	01121	RC07GF431J
1A6	295511-1	1	610-710 MHz FILTER CONVERTER ASSEMBLY	56872	295511-1
FL1	293608-1	4	FILTER CONNECTOR	72982	1201-066
FL2	293608-1		FILTER CONNECTOR	72982	1201-066
FL3	293608-1		FILTER CONNECTOR	72982	1201-066
FL4	293608-1		FILTER CONNECTOR	72982	1201-066
J1	299233-1	4	CONNECTOR, BULKHEAD	98291	51-045-0000
J2	299233-1		CONNECTOR, BULKHEAD	98291	51-045-0000
J3	295510	1	CONNECTOR, CABLE ASSEMBLY	56872	295510
J4	299233-1		CONNECTOR, BULKHEAD	98291	51-045-0000
J5	299233-1		CONNECTOR, BULKHEAD	98291	51-045-0000
1A6A1	295505	1	610-710 MHz BPF/CONVERTER PC BOARD ASSEMBLY	56872	295505
C1	299243-1	4	CAPACITOR, .001 uF	56289	CK60AW102M
C2	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C3			NOT USED		
C4	299241-270	2	CAPACITOR, 27 pF	72136	DM5-270J
C5	299241-820	1	CAPACITOR, 82 pF	72136	DM5-820J
C6	299241-270		CAPACITOR, 27 pF	72136	DM5-270J
C7	299245-1	3	CAPACITOR, .01 uF	72982	8121-M058-651-103M
C8	299240-1	2	CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C9	299244-1	2	CAPACITOR, .01 uF	72982	8121-M058-651-103M
C10	299240-1		CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C11	299244-1		CAPACITOR, .01 uF	72982	8121-M058-651-103M
C12	299250-151	1	CAPACITOR, 150 pF	14655	CM04FD151J03
C13	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
C14	299245-1		CAPACITOR, 0.1 uF	72982	8121-M058-651-104M
C15	299245-1		CAPACITOR, 0.1 uF	72982	8121-M058-651-104M
C16	299243-1		CAPACITOR, .001 uF	56289	CK60AW102M
E1	293310	4	TERMINAL	71279	1597-2-01
E2	293306	3	TERMINAL	71279	1019-2-901
E3	293310		TERMINAL	71279	1597-2-01
E4	293310		TERMINAL	71279	1597-2-01
E5	293310		TERMINAL	71279	1597-2-01
E6			P/O PC BOARD		
E7	293306		TERMINAL	71279	1019-2-901
E8	293306		TERMINAL	71279	1019-2-901
L1	299237-42	3	INDUCTOR, 8.2 uH	95275	VY10CA8R2JE
L2	299237-12	4	INDUCTOR, .47 uH	99800	1025-012
L3			NOT USED		
L4	299237-12		INDUCTOR, .47 uH	99800	1025-012
L5	299237-12		INDUCTOR, .47 uH	99800	1025-012
L6	299237-00	2	INDUCTOR, 0.15 uH	99800	1025-00
L7	299237-00		INDUCTOR, 0.15 uH	99800	1025-00
L8	299237-42		INDUCTOR, 8.2 uH	95275	VY10CA8R2JE
L9	299237-42		INDUCTOR, 8.2 uH	95275	VY10CA8R2JE
L10	299237-12		INDUCTOR, .47 uH	99800	1025-012
M1	231104-3	1	MIXER	15542	SRA-1WH
Q1	294153	1	TRANSISTOR	04713	2N4126
Q2	299239-1	1	TRANSISTOR	04713	2N5179
Q3	294165	1	TRANSISTOR	86684	2N5109
R1	299701-362	2	RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R2	299701-102	1	RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R3	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr. Code	Mfr. Part Number
1A6A1R4	299701-470	3	RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R5	299701-301	4	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R6	299701-180	2	RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R7	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R8			NOT USED		
R9	299701-470		RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R10	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R11	299701-470		RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R12	299701-821	1	RESISTOR, 820 Ω, 1/4 W	01121	RC07GF821J
R13	299701-471	1	RESISTOR, 470 Ω, 1/4 W	01121	RC07GF471J
R14	299701-180		RESISTOR, 18 Ω, 1/4 W	01121	RC07GF180J
R15	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R16	299702-271	1	RESISTOR, 270 Ω, 1/2 W	01121	RC07GF271J
1A6A2	298459		BANDPASS FILTER PC BOARD	56872	298459
1A7	295536	1	MULTIPLIER SECTION ASSEMBLY	56872	295536
A1	296636	1	390 MHz PWR AMPLIFIER PC BOARD	56872	296636
A2	295947	1	X10 MULTIPLIER/FILTER PC BOARD	56872	295947
A3	295290	1	610/710 MHz AMPLIFIER PC BOARD	56872	295290
A4	295260	1	X5 MULTIPLIER/FILTER PC BOARD	56872	295260
C1	299250-391	1	CAPACITOR, 390 pF	14655	CM04FA391J03
CR1 (X10)	294449	2	STEP RECOVERY DIODE	50101	GC 20258-42
CR1 (X5)	294449		STEP RECOVERY DIODE	50101	GC 20258-42
FL1	293608	4	FILTER	72982	1201-066
FL2	293608		FILTER	72982	1201-066
FL3	293608		FILTER	72982	1201-066
FL4	293608		FILTER	72982	1201-066
J1	299233	2	CONNECTOR	98291	51-045-0000
J2	295393	2	CONNECTOR	56872	295393
J3	299233		CONNECTOR	98291	51-045-0000
J5	295393		CONNECTOR	56872	295393
1A7A1	296636	1	390 MHz AMPLIFIER PC BOARD	56872	296636
C1	299245-4	11	CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C2	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C3	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C4	299241-180	3	CAPACITOR, 18 pF	72136	DM5CC-180J
C5	299241-040	1	CAPACITOR, 4 pF	72136	DM5CC-040D
C6	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C7	292916	3	CAPACITOR, VARIABLE, 3-10 pF	91293	9325
C8	299241-560	2	CAPACITOR, 56 pF	72136	DM5EC-560J
C9	293916		CAPACITOR, VARIABLE, 3-10 pF	91293	9325
C10	296639-1	4	CAPACITOR, CHIP, 1000 pF	72982	MA21101
C11	296639-1		CAPACITOR, CHIP, 1000 pF	72982	MA21101
C12	299241-080	1	CAPACITOR, 8 pF	72136	DM5CC-080D
C13	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C14	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C15	299241-560		CAPACITOR, 56 pF	72136	DM5EC-560J
C16	299241-180		CAPACITOR, 18 pF	72136	DM5CC-180J
C17	296639-1		CAPACITOR, CHIP, 1000 pF	72982	MA21101
C18	296639-1		CAPACITOR, CHIP, 1000 pF	72982	MA21101
C19	299241-180		CAPACITOR, 18 pF	72136	DM5CC-180J
C20	293916		CAPACITOR, VARIABLE (3-10 pF)	91293	9325
C21	293792	3	CAPACITOR, 2.20 uF	56289	CSR13BE225K
C22	293792		CAPACITOR, 2.20 uF	56289	CSR13BE225K
C23	293792		CAPACITOR, 2.20 uF	56289	CSR13BE225K
C24	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C25	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C26	299241-120		CAPACITOR, 12 pF	72136	DM5CC-120J
C27	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C28	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K
C29	299245-4		CAPACITOR, 1000 pF	72982	8121-M058-W5RO-102K

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A7A1C30	299241-200	1	CAPACITOR, 20 pF	72136	DM5CC-200J
CR1	294450	3	DIODE	32421	DP15017-11
CR2	294450		DIODE	32421	DP15017-11
CR3	299251-1	1	DIODE	72314	1N4009
CR4	294450		DIODE	32421	DP15017-11
E1	293306	5	TERMINAL	71279	1019-2-901
E2	293306		TERMINAL	71279	1019-2-901
E3	293306		TERMINAL	71279	1019-2-901
E4	293306		TERMINAL	71279	1019-2-901
E5	293306		TERMINAL	71279	1019-2-901
E6			P/O PC BOARD		
E7			P/O PC BOARD		
E8			P/O PC BOARD		
L1	298899-1	2	INDUCTOR, 0.03 uH	56872	298899-1
L2	298899-8	1	INDUCTOR, 0.04 uH	56872	298899-8
L3			PRINTED ON BOARD		
L4			PRINTED ON BOARD		
L5			PRINTED ON BOARD		
L6	299237-04	9	INDUCTOR, .22 uH	99800	1025-04
L7	299237-04		INDUCTOR, .22 uH	99800	1025-04
L8			PRINTED ON BOARD		
L9	299237-04		INDUCTOR, .22 uH	99800	1025-04
L10			PRINTED ON BOARD		
L11	299237-04		INDUCTOR, .22 uH	99800	1025-04
L12	299237-04		INDUCTOR, .22 uH	99800	1025-04
L13			PRINTED ON BOARD		
L14	299237-04		INDUCTOR, .22 uH	99800	1025-04
L15	299237-08	1	INDUCTOR, .33 uH	99800	1025-08
L16	299237-04		INDUCTOR, .22 uH	99800	1025-04
L17	299237-04		INDUCTOR, .22 uH	99800	1025-04
L18	298899-1		INDUCTOR, .03 uH	56872	298899-1
L19			NOT USED		
L20	299237-004		INDUCTOR, .22 uH	99800	1025-04
Q1	299239	1	TRANSISTOR	04713	2N5179
Q2	294182	1	TRANSISTOR	00779	BFR-96
Q3	295540	1	TRANSISTOR	50155	C1-12Z (Modified)
Q4	295539	1	TRANSISTOR	50155	C3-12 (Modified)
Q5	294058	1	TRANSISTOR	04713	MJE700
R1	299700-472	3	RESISTOR, 4.7 K, 1/8 W	01121	RC05GF472J
R2	299700-472		RESISTOR, 4.7 K, 1/8 W	01121	RC05GF472J
R3	299700-331	1	RESISTOR, 330 Ω, 1/8 W	01121	RC05GF331J
R4	299700-182	1	RESISTOR, 1.8 K, 1/8 W	01121	RC05GF182J
R5	299700-681	1	RESISTOR, 680 Ω, 1/8 W	01121	RC05GF681J
R6	299700-470	3	RESISTOR, 47 Ω, 1/8 W	01121	RC05GF470J
R7			NOT USED		
R8	299700-470		RESISTOR, 47 Ω, 1/8 W	01121	RC05GF470J
R9	299701-101	2	RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R10	299700-301	2	RESISTOR, 300 Ω, 1/8 W	01121	RC05GF301J
R11	299700-301		RESISTOR, 300 Ω, 1/8 W	01121	RC05GF301J
R12	299700-301		RESISTOR, 300 Ω, 1/8 W	01121	RC05GF301J
R13	299701-270	1	RESISTOR, 27 Ω, 1/4 W	01121	RC07GF270J
R14	299701-101		RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R15	299700-470		RESISTOR, 47 Ω, 1/8 W	01121	RC05GF470J
R16	299700-301	1	RESISTOR, 300 Ω, 1/8 W	01121	RC07GF301J
R17	299700-472		RESISTOR, 4.7 K, 1/4 W	01121	RC07GF472J
1A7A2	295947	1	X10 MULTIPLIER/FILTER PC BOARD	56872	295947
AT1	294455-001	1	ATTENUATOR	24602	05-125-A-3db
C1	293591-003	1	CAPACITOR, 1000 pF	72982	PE001M
C2	293530-004	1	CAPACITOR, 27 pF	72136	DM5-270J
C3	293530-003	1	CAPACITOR, 56 pF	72136	DM5-560J
C4			CAPACITOR PRINTED ON PC BOARD		

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A7A2L2	295541	1	INDUCTOR	56872	295541
L3	295537-1	1	STRIP	56872	295537-1
R1	294747	1	RESISTOR, VARIABLE 1 K	80294	3339P-1-102
R2	299701-181	1	RESISTOR, 180 Ω, 1/4 W	01121	RC07GF181J
1A7A3	295290	1	610/710 MHz AMPLIFIER PC BOARD	56872	295290
C1	293591-003	8	CAPACITOR, 1000 pF	72982	PE001M
C2	299245-2	2	CAPACITOR, .01 pF	72982	8121-M058-651-103M
C3	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C4	299241-040	2	CAPACITOR, 4 pF, DIPPED MICA	72136	DM5CC-040D
C5	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C6	293916	2	CAPACITOR, VARIABLE, 3-10 pF	91293	9325
C7	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C8	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C9	293792	2	CAPACITOR, 2.20 uF, 35V	56289	CSR13BE225K
C10	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C11	299241-040		CAPACITOR, 4 pF, DIPPED MICA	72136	DM5CC-040D
C12	293916		CAPACITOR, VARIABLE, 3-10 pF	91293	9325
C13	299245-2		CAPACITOR, .01 pF	72982	8121-M058-651-103M
C14	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C15	293591-003		CAPACITOR, 1000 pF	72982	PE001M
C16	293792		CAPACITOR, 2.20 uF, 35V	56289	CSR13BE225K
C17	299241-391	1	CAPACITOR, 390 pF, DIPPED MICA	72136	DM5-391J
C18	299240-1	1	CAPACITOR, 6.8 uF, 35 VDC	31433	T368B685M035AS
L1	299237-08	4	INDUCTOR, .33 uH	99800	1025-08
L2			PRINTED ON PC BOARD		
L3	299237-48	2	INDUCTOR, 15 uH	99800	1025-00
L4	299237-48		INDUCTOR, 15 uH	99800	1025-00
L5			PRINTED ON PC BOARD		
L6	299237-08		INDUCTOR, .33 uH	99800	1025-08
L7	299237-08		INDUCTOR, .33 uH	99800	1025-08
L8	299237-08		INDUCTOR, .33 uH	99800	1025-08
Q1	294180-002	2	TRANSISTOR, D 1/2-12 (DHEO)	01121	D 1/2-12
Q2	294180-002		TRANSISTOR, D 1/2-12 (DHEO)	01121	D 1/2-12
R1	299700-100	2	RESISTOR, 10 Ω, 1/8 W, 5%	01121	RC05GF100J
R2	299701-332	2	RESISTOR, 3.3K, 1/4 W	01121	RC07GF332J
R3	299701-152	2	RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R4	299701-220	2	RESISTOR, 22 Ω, 1/4 W	01121	RC07GF220J
R5	299700-100		RESISTOR, 10 Ω, 1/8 W, 5%	01121	RC05GF100J
R6	299701-332		RESISTOR, 3.3 K, 1/4 W	01121	RC07GF332J
R7	299701-152		RESISTOR, 1.5 K, 1/4 W	01121	RC07GF152J
R8	299701-220		RESISTOR, 22 Ω, 1/4 W	01121	RC07GF220J
R9			NOT USED		
R10	299701-470	1	RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
R11	299701-301	1	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
U1	293523	1	AMPLIFIER	25403	ATF-417
1A7A4	295260		X5 MULTIPLIER/FILTER PC BOARD	56872	295260
AT1			NOT USED		
AT2	294455-001	1	ATTENUATOR	24602	05-125A-3db
C1	293591-003	1	CAPACITOR, 1000 pF	72982	PE001M
C2	295391-001	1	CAPACITOR, 3.9 pF	95275	PC3.9K
C3	295391-002	1	CAPACITOR, 8.2 pF	95272	PC8.2K
C4	293530-001	2	CAPACITOR, 22 pF	95275	VK11CY220K
C5	293530-001		CAPACITOR, 22 pF	95275	VK11CY220K
L1	295470	2	INDUCTOR	56872	295470
L2	295470		INDUCTOR	56872	295470
L3	295537-3	2	INDUCTOR, STRIP	56872	295537-3
L4	295537-3		INDUCTOR, STRIP	56872	295537-3
L5	295537-2	1	INDUCTOR, STRIP	56872	295537-2
R1			NOT USED		
R2			NOT USED		
R3	299700-270	1	RESISTOR, 27 Ω, 1/8 W	01121	RC05GF270J
R4	299700-101	1	RESISTOR, 100 Ω, 1/8 W	01121	RC05GF101J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8	295530	1	OUTPUT SECTION, ASSEMBLY	56872	295530
A1	295868-2	1	FREQUENCY SCALER PC BOARD	56872	295868-2
A2	295451-2	1	OUTPUT AMPLIFIER, PC BOARD	56872	295451-2
FL1	294211	11	FILTERCONNECTOR	72982	1250-003
FL2	294211		FILTERCONNECTOR	72982	1250-003
FL3	294211		FILTERCONNECTOR	72982	1250-003
FL4	294211		FILTERCONNECTOR	72982	1250-003
FL5	294211		FILTERCONNECTOR	72982	1250-003
FL6	294211		FILTERCONNECTOR	72982	1250-003
FL7	294211		FILTERCONNECTOR	72982	1250-003
FL8	294211		FILTERCONNECTOR	72982	1250-003
FL9	294211		FILTERCONNECTOR	72982	1250-003
FL10	294211		FILTERCONNECTOR	72982	1250-003
FL11	294211		FILTERCONNECTOR	72982	1250-003
J1	295396-1	3	CONN, RT ANGLE, BULKHEAD	98291	51-347-0000
J2	295396-1		CONN, RT ANGLE, BULKHEAD	98291	51-347-0000
J3	295396-1		CONN, RT ANGLE, BULKHEAD	98291	51-347-0000
R1	299701-750	1	RESISTOR, 75 Ω, 1/4 W	01121	RC07GF750J
R2	299701-101	2	RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R3	299701-101		RESISTOR, 100 Ω, 1/4 W	01121	RC07GF101J
R36	299701-470	1	RESISTOR, 47 Ω, 1/4 W	01121	RC07GF470J
1A8A1	295868-2	1	FREQUENCY SCALER, PC BOARD	56872	295868-2
C1	299245-4	25	CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C2			NOT USED		
C3			NOT USED		
C4	299240-1	2	CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C5	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C6	293591-003	21	CAPACITOR, CHIP, 1000 pF	72982	PE001M
C7	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C8	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C9	299245-2	1	CAPACITOR, CERAMIC, 01 pF	72982	8121-M058-651-103M
C10	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C11	299245-4		CAPACITOR, CERAMIC 1000 pF	72982	8121-M058-W5RO-102K
C12	299240-1		CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C13	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C14	293591-002	4	CAPACITOR, CHIP, 8.2 pF	95275	PC8.2K
C15	293530-003	1	CAPACITOR, CHIP 56 pF	95275	VK11CX560K
C16	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C17	293591-002		CAPACITOR, CHIP, 8.2 pF	95275	PC8.2K
C18	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C19	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C20	293913	9	CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C21	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C22	299241-100	1	CAPACITOR, DIPPED MICA, 10 pF	72136	DM5-100J
C23			NOT USED		
C24	299241-101	1	CAPACITOR, DIPPED MICA, 100 pF	72136	DM5-101J
C25	299241-560	3	CAPACITOR, DIPPED MICA, 56 pF	72136	DM5-560J
C26	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C27	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C28	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C29	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C30	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C31	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C32	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C33	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C34	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C35	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C36	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C37	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C38	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C39	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A1C40	299241-560		CAPACITOR, DIPPED MICA, 56 pF	72136	DM560J
C41	299241-820	1	CAPACITOR, DIPPED MICA, 82 pF	72136	DM5-820J
C42	299241-560		CAPACITOR, DIPPED MICA, 56 pF	72136	DM5-560J
C43	299241-270	3	CAPACITOR, DIPPED MICA, 27 pF	72136	DM5-270J
C44	299241-430	1	CAPACITOR, DIPPED MICA, 43 pF	72136	DM5-430J
C45	299241-270		CAPACITOR, DIPPED MICA, 27 pF	72136	DM5-270J
C46	299241-120	2	CAPACITOR, DIPPED MICA, 12 pF	72136	DM5-120J
C47	299241-150	1	CAPACITOR, DIPPED MICA, 15 pF	72136	DM5-150J
C48	299241-120		CAPACITOR, DIPPED MICA, 12 pF	72136	DM5-120J
C49	293591-002		CAPACITOR, CHIP, 8.2 pF	95275	PC8.2K
C50	293591-001	4	CAPACITOR, CHIP, 3.9 pF	95275	PC3.9K
C51	293591-001		CAPACITOR, CHIP, 3.9 pF	95275	PC3.9K
C52	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C53	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C54	293591-001		CAPACITOR, CHIP, 3.9 pF	95275	PC3.9K
C55	293591-001		CAPACITOR, CHIP, 3.9 pF	95275	PC3.9K
C56	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C57	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C58	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C59	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C60	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C61	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C62	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C63	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C64	293913		CAPACITOR, LEADED CHIP, 200 pF	29990	700B-201-MM5
C65	293591-004	1	CAPACITOR, CHIP, .01 uF	72982	PG01N
C66	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C67	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C68	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C69	299245-1	2	CAPACITOR, CERAMIC, 0.1 uF	72982	8121-M058-651-104M
C70			NOT USED		
C71	293530-1	1	CAPACITOR, CHIP, 22 pF	95275	VX11CX220X
C72	293591-002		CAPACITOR, CHIP, 8.2 pF	95275	PC8.2K
C73	299241-080	1	CAPACITOR, DIPPED MICA, 8 pF	72136	DM5-080J
C74	299241-270		CAPACITOR, DIPPED MICA, 27 pF	72136	DM5-270J
C75	299241-200	1	CAPACITOR, DIPPED MICA, 20 pF	72136	DM5-200J
C76	293591-006		CAPACITOR, CHIP, 2.2 pF	95275	PC2.2K
C77			NOT USED		
C78			NOT USED		
C79	299245-1		CAPACITOR, CERAMIC, 0.1 uF	72982	8121-M058-651-104M
C80	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C81	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C82	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C83	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C84			NOT USED		
C85	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C86			NOT USED		
C87			NOT USED		
C88			NOT USED		
C89	299245-4		CAPACITOR, CERAMIC, 1000 pF	72982	8121-M058-W5RO-102K
C90	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C91	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C92	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C93	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C94	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C95	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C96	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M
C97			NOT USED		
C98	293591-003		CAPACITOR, CHIP, 1000 pF	72982	PE001M

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A1CR1	294450	11	DIODE	32421	DP15017-011
CR2	294450		DIODE	32421	DP15017-011
CR3	294450		DIODE	32421	DP15017-011
CR4	294450		DIODE	32421	DP15017-011
CR5	299236-1	8	DIODE	96341	5082-3077
CR6	299236-1		DIODE	96341	5082-3077
CR7	299236-1		DIODE	96341	5082-3077
CR8	299236-1		DIODE	96341	5082-3077
CR9	299236-1		DIODE	96341	5082-3077
CR10	299236-1		DIODE	96341	5082-3077
CR11	299236-1		DIODE	96341	5082-3077
CR12	299236-1		DIODE	96341	5082-3077
CR13	299251-1	5	DIODE	72314	1N4009
CR14	294450		DIODE	32421	DP15017-011
CR15	299291	1	DIODE	28480	HPA5082-2800
CR16	294450		DIODE	32421	DP15017-011
CR17	294450		DIODE	32421	DP15017-011
CR18	294450		DIODE	32421	DP15017-011
CR19	294450		DIODE	32421	DP15017-011
CR20	294450		DIODE	32421	DP15017-011
CR21	294450		DIODE	32421	DP15017-011
CR22	299251-1		DIODE	72314	1N4009
CR23	299251-1		DIODE	72314	1N4009
CR24	299251-1		DIODE	72314	1N4009
CR25	299251-1		DIODE	72314	1N4009
E1	293306	11	TERMINAL, SOLDER	71279	1019-2-901
E2	293306		TERMINAL, SOLDER	71279	1019-2-901
E3	293306		TERMINAL, SOLDER	71279	1019-2-901
E4	293306		TERMINAL, SOLDER	71279	1019-2-901
E5	293306		TERMINAL, SOLDER	71279	1019-2-901
E6	293306		TERMINAL, SOLDER	71279	1019-2-901
E7	293306		TERMINAL, SOLDER	71279	1019-2-901
E8	293306		TERMINAL, SOLDER	71279	1019-2-901
L1	299237-28	11	INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L2			NOT USED		
L3	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L4	299237-94	2	INDUCTOR, MOLDED, 0.1 uH	99800	1025-94
L5	299237-94		INDUCTOR, MOLDED, 0.1 uH	99800	1025-94
L6			NOT USED		
L7	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L8	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L9	298899-3	4	INDUCTOR, 0.05 uH	56872	298899-3
L10	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L11	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L12			NOT USED		
L13	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L14	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L15	298899-7	2	INDUCTOR, 109 nH	56872	298899-7
L16	298899-7		INDUCTOR, 109 nH	56872	298899-7
L17	298899-3		INDUCTOR, 58 nH	56872	298899-3
L18	298899-3		INDUCTOR, 58 nH	56872	298899-3
L19	294231	2	INDUCTOR, A/R	56872	294231
L20	294231		INDUCTOR, A/R	56872	294231
L21	990080-10	2	#24 GA COPPER WIRE	56872	990080-10
L22	295551	2	INDUCTOR, WOUND	56872	295551
L23	990080-10		#24 GA COPPER WIRE	56872	990080-10
L24	295551		INDUCTOR, WOUND	56872	295551
L25			NOT USED		
L26			NOT USED		
L27	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L28	298899-3		INDUCTOR, 0.05 uH	56872	298899-3
L29	298899-4	1	INDUCTOR, 0.08 uH	56872	298899-4

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A1L30	298899-1	1	INDUCTOR, 0.03 uH	56872	298899-1
L31	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
L32	299237-28		INDUCTOR, MOLDED, 2.2 uH	99800	1025-28
Q1	294153	12	TRANSISTOR	04713	2N4126
Q2	294153		TRANSISTOR	04713	2N4126
Q3	295496	1	TRANSISTOR, MODIFIED	56872	295496
Q4	294153	2	TRANSISTOR	04713	2N4126
Q5	299239-1	2	TRANSISTOR	04713	2N5179
Q6	294153		TRANSISTOR	04713	2N4126
Q7	299239-1		TRANSISTOR	04713	2N5179
Q8	294153		TRANSISTOR	04713	2N4126
Q9	294153		TRANSISTOR	04713	2N4126
Q10	294153		TRANSISTOR	04713	2N4126
Q11	294153		TRANSISTOR	04713	2N4126
Q12	294153		TRANSISTOR	04713	2N4126
Q13	295498	2	TRANSISTOR, MODIFIED	56872	295498
Q14	295498		TRANSISTOR, MODIFIED	56872	295498
Q15	294153		TRANSISTOR	04713	2N4126
Q16	294153		TRANSISTOR	04713	2N4126
Q17	294153		TRANSISTOR	04713	2N4126
R1	299701-301	3	RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R2	299701-180	1	RESISTOR, 18 Ω, 1/4 W, 5%	01121	RC07GF180J
R3	299701-301		RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R4	299701-472	5	RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R5	299701-152	11	RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R6	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R7	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R8	299700-391	2	RESISTOR, 390 Ω, 1/8 W, 5%	01121	RC07GF391J
R9	299700-201	12	RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC07GF201J
R10	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC07GF201J
R11	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC07GF201J
R12	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R13	299701-621	1	RESISTOR, 620 Ω, 1/4 W, 5%	01121	RC07GF621J
R14	299701-301		RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R15	299700-680	1	RESISTOR, 68 Ω, 1/8 W, 5%	01121	RC05GF680J
R16	299700-103	11	RESISTOR, 10 K, 1/8 W, 5%	01121	RC07GF103J
R17	299701-242	7	RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R18	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R19	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R20	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R21	299700-151	1	RESISTOR, 150 Ω, 1/8 W, 5%	01121	RC07GF151J
R22	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R23	299701-202	1	RESISTOR, 2 K, 1/4 W, 5%	01121	RC07GF202J
R24	299701-161	1	RESISTOR, 160 Ω, 1/4 W, 5%	01121	RC07GF161J
R25	299700-750	2	RESISTOR, 75 Ω, 1/8 W, 5%	01121	RC05GF750J
R26	299700-101	2	RESISTOR, 100 Ω, 1/8 W, 5%	01121	RC07GF101J
R27	299700-750		RESISTOR, 75 Ω, 1/8 W, 5%	01121	RC07GF750J
R28	299700-152	5	RESISTOR, 1.5 K, 1/8 W, 5%	01121	RC05GF152J
R29	299700-152		RESISTOR, 1.5 K, 1/8 W, 5%	01121	RC05GF152J
R30	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC07GF103J
R31	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R32	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R33	299701-102	5	RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R34	299700-102	1	RESISTOR, 1 K, 1/8 W, 5%	01121	RC05GF102J
R35	299700-362	1	RESISTOR, 3.6 K, 1/8 W, 5%	01121	RC05GF362J
R36	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R37	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R38	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R39	299700-471	3	RESISTOR, 470 Ω, 1/8 W, 5%	01121	RC05GF471J
R40	299701-471	1	RESISTOR, 470 Ω, 1/4 W, 5%	01121	RC07GF471J
R41	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R42	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R43	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A1R44	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R45	299700-152		RESISTOR, 1.5 K, 1/8 W, 5%	01121	RC05GF152J
R46	299700-472	3	RESISTOR, 4.7 K, 1/8 W, 5%	01121	RC05GF472J
R47	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R48	299700-152		RESISTOR, 1.5 K, 1/8 W, 5%	01121	RC05GF152J
R49	299700-472		RESISTOR, 4.7 K, 1/8 W, 5%	01121	RC05GF472J
R50	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R51			NOT USED		
R52	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R53	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R54	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R55	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R56	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R57	299701-330	2	RESISTOR, 33 Ω, 1/4 W, 5%	01121	RC07GF330J
R58	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R59	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R60	299701-330		RESISTOR, 33 Ω, 1/4 W, 5%	01121	RC07GF330J
R61	299700-301	6	RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R62	299700-180	2	RESISTOR, 18 Ω, 1/8 W, 5%	01121	RC05GF180J
R63			NOT USED		
R64	299701-201	1	RESISTOR, 200 Ω, 1/4 W, 5%	01121	RC07GF201J
R65	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R66	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R67	299700-201		RESISTOR, 200 Ω, 1/8 W, 5%	01121	RC05GF201J
R68	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R69	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R70	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R71	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R72	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R73	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R74			NOT USED		
R75			NOT USED		
R76	299700-301		RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R77			NOT USED		
R78			NOT USED		
R79			NOT USED		
R80	299700-470	1	RESISTOR, 47 Ω, 1/8 W, 5%	01121	RC05GF470J
R81	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R82	299701-391	2	RESISTOR, 390 Ω, 1/4 W, 5%	01121	RC07GF391J
R83	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R84			NOT USED		
R85			NOT USED		
R86	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R87	294747	1	RESISTOR, VARIABLE, 1 K	80294	3339P-1-102
R88	299700-471		RESISTOR, 470 Ω, 1/8 W, 5%	01121	RC05GF471J
R89	299700-180		RESISTOR, 18 Ω, 1/8 W, 5%	01121	RC05GF180J
R90	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R91	299701-362	1	RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R92	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R93	299700-301		RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R94	299700-301		RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R95	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R96	299700-103		RESISTOR, 10 K, 1/8 W, 5%	01121	RC05GF103J
R97	299701-242		RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R98	299701-821	2	RESISTOR, 820 Ω, 1/4 W, 5%	01121	RC07GF821J
R99	299700-301		RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R100	299700-301		RESISTOR, 300 Ω, 1/8 W, 5%	01121	RC05GF301J
R101	299700-391		RESISTOR, 390 Ω, 1/8 W, 5%	01121	RC05GF391J
R102	299701-391		RESISTOR, 390 Ω, 1/4 W, 5%	01121	RC07GF391J
R103	299700-242	1	RESISTOR, 2.4 K, 1/8 W, 5%	01121	RC05GF242J
R104	299701-821		RESISTOR, 820 Ω, 1/4 W, 5%	01121	RC07GF821J
R105	299700-472		RESISTOR, 4.7 K, 1/8 W, 5%	01121	RC05GF472J
R106	299700-152		RESISTOR, 1.5 K, 1/8 W, 5%	01121	RC05GF152J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A1R107	299700-471		RESISTOR, 470 Ω, 1/8 W, 5%	01121	RC05GF471J
R108			NOT USED		
R109			NOT USED		
R110	299700-101		RESISTOR, 100 Ω, 1/8 W, 5%	01121	RC05GF101J
R111	299701-100	1	RESISTOR, 10 Ω, 1/4 W, 5%	01121	RC07GF100J
T1	295550-1	2	TRANSFORMER, MODIFIED	56872	295550-1
T2	295550-1		TRANSFORMER, MODIFIED	56872	295550-1
T3	295550-2	1	TRANSFORMER, MODIFIED	56872	295550-2
U1	293523	1	HYBRID INTEGRATED CIRCUIT	25403	ATF417
U2	293524	2	DIVIDER	52648	SP8607B
U3	293524		DIVIDER	52648	SP8607B
U4	293500-002	1	DIVIDER	04713	MC1670L
U5	293501	1	INTEGRATED CIRCUIT	01295	SN7442N
U6			NOT USED		
U7	293354-1	1	INTEGRATED CIRCUIT	72314	UA741C-V
X1	295552	1	FREQUENCY DOUBLER	56872	295552
Z1	299553-1	1	HIGH PASS FILTER ASSEMBLY	56872	299553-1
Z2	299554-1	1	BAND PASS FILTER ASSEMBLY	56872	299554-1
1A8A2	295451-2	1	OUTPUT AMPLIFIER, PC BOARD	56872	295451-2
AT1	294457	2	DIODE ATTENUATOR MODULE	56872	294457
AT2	294457		DIODE ATTENUATOR MODULE	56872	294457
C1	299245-1	7	CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C2	299240-1	2	CAPACITOR, 6.8 uF, 35V	31433	T368B685M035AS
C3	293591-005	6	CAPACITOR CHIP, .01 uF	72982	66659-1
C4	293591-005		CAPACITOR CHIP, .01 uF	72982	66659-1
C5	293591-331	2	CAPACITOR CHIP, 330 pF	72982	PE330K
C6	293591-331		CAPACITOR CHIP, 330 pF	72982	PE330K
C7	293591-005		CAPACITOR CHIP, .01 uF	72982	66659-1
C8	293591-005		CAPACITOR CHIP, .01 uF	72982	66659-1
C9	299241-050	2	CAPACITOR MICA 5 pF	72982	DM5CC-050D
C10	299241-050		CAPACITOR MICA 5 pF	72982	DM5CC-050D
C11	299243-1	1	CAPACITOR, CERAMIC, .001 uF	72982	8121-M108CDG0102K
C12	299245-5	1	CAPACITOR, CERAMIC, .0033 uF	72982	8121-100-W5R0-332K
C13	293530-005	1	CAPACITOR CHIP, 100 pF	72982	VK11CX101K
C14	293591-005		CAPACITOR CHIP, .01 uF	72982	66659-1
C15	293591-003	16	CAPACITOR CHIP, 1000 pF	72982	PE001M
C16	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C17	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C18	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C19	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C20	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C21	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C22	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C23	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C24	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C25	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C26	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C27	299245-2	3	CAPACITOR, CERAMIC, .01 uF	72982	8121-M058-651-103M
C28	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C29	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C30	299245-2		CAPACITOR, CERAMIC, .01 uF	72982	8121-M058-651-103M
C31	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C32	299240-1		CAPACITOR, 6.8 uF, 35V	31433	T368B685M035AS
C33	299245-2		CAPACITOR, CERAMIC, .01 uF	72982	8121-M058-651-103M
C34	293591-005		CAPACITOR CHIP, .01 pF	72982	66659-1
C35	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C36	299245-1		CAPACITOR, CERAMIC, .1 uF	72982	8121-M058-651-104M
C37	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C38	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C39	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C40	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
C41	299245-13	1	CAPACITOR, CERAMIC, .0022 uF	72982	8121-M108-X7RD-222K

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A2C42	293591-003		CAPACITOR CHIP, 1000 pF	72982	PE001M
CR1	293200	1	DIODE	72314	1N645
CR2	299251-1	1	DIODE	72314	1N4009
CR3	293630	1	DIODE	28480	HP-5082-2787
E2	293306	9	TERMINAL, SOLDER	71279	1019-2-901
E3	293306		TERMINAL, SOLDER	71279	1019-2-901
E4	293306		TERMINAL, SOLDER	71279	1019-2-901
E5	293306		TERMINAL, SOLDER	71279	1019-2-901
E6	293306		TERMINAL, SOLDER	71279	1019-2-901
E7	293306		TERMINAL, SOLDER	71279	1019-2-901
E8	293306		TERMINAL, SOLDER	71279	1019-2-901
E9	293306		TERMINAL, SOLDER	71279	1019-2-901
E10	293306		TERMINAL, SOLDER	71279	1019-2-901
J3	295836	1	CONNECTOR	98291	295836
J5	295510-2	1	CABLE ASSEMBLY	56872	299510-2
L1	299237-08	2	INDUCTOR, .33 uH	99800	1025-08
L2	299237-08		INDUCTOR, .33 uH	99800	1025-08
L3	299237-14	1	INDUCTOR, .56 uH	99800	1025-14
L4	299237-94	4	INDUCTOR, .1 uH	99800	1025-94
L5	299237-94		INDUCTOR, .1uH	99800	1025-94
L6	299237-94		INDUCTOR, .1 uH	99800	1025-94
L7	299237-94		INDUCTOR, .1 uH	99800	1025-94
L8	296556	2	INDUCTOR, FERRITE BEAD	56872	296556
L9	296556		INDUCTOR, FERRITE BEAD	56872	296556
Q1	294158	2	TRANSISTOR	04713	2N4403
Q2	294158		TRANSISTOR	04713	2N4403
Q3	294151	1	TRANSISTOR	04713	2N4124
Q4	294153	2	TRANSISTOR	04713	2N4126
Q5	294153		TRANSISTOR	04713	2N4126
Q6	294156	1	TRANSISTOR	04713	2N4392
R1	299701-151	2	RESISTOR, 150 Ω, 1/4 W, 5%	01121	RC20GF151J
R2	299701-102	6	RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R3	299701-203	2	RESISTOR, 20 K, 1/4 W, 5%	01121	RC07GF203J
R4	299701-511	1	RESISTOR, 510 Ω, 1/4 W, 5%	01121	RC07GF511J
R5	299701-203		RESISTOR, 20 K, 1/4 W, 5%	01121	RC07GF203J
R6	299701-681	2	RESISTOR, 680 Ω, 1/4 W, 5%	01121	RC07GF681J
R7	299700-102	2	RESISTOR, 1 K, 1/8 W, 5%	01121	RC05GF102J
R8	299700-681	1	RESISTOR, 680 Ω, 1/8 W, 5%	01121	RC05GF681J
R9	299700-180	2	RESISTOR, 18 Ω, 1/8 W, 5%	01121	RC05GF180J
R10	299700-180		RESISTOR, 18 Ω, 1/8 W, 5%	01121	RC05GF180J
R11	299700-471	1	RESISTOR, 470 Ω, 1/8 W, 5%	01121	RC05GF471J
R12	299701-151		RESISTOR, 150 Ω, 1/4 W, 5%	01121	RC20GF151J
R13	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R14	299701-152	1	RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R15	299701-472	1	RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R16	299701-473	1	RESISTOR, 47 K, 1/4 W, 5%	01121	RC07GF473J
R17	299701-223	1	RESISTOR, 22 K, 1/4 W, 5%	01121	RC07GF223J
R18	299701-681		RESISTOR, 680 Ω, 1/4 W, 5%	01121	RC07GF681J
R19	299701-471	2	RESISTOR, 470 Ω, 1/4 W, 5%	01121	RC07GF471J
R20	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R21	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R22	299701-471		RESISTOR, 470 Ω, 1/4 W, 5%	01121	RC07GF471J
R23	299701-242	1	RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R24	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J
R25	299701-132	1	RESISTOR, 1.3 K, 1/4 W, 5%	01121	RC07GF132J
R26	299701-302	1	RESISTOR, 3 K, 1/4 W, 5%	01121	RC07GF302J
R27	299701-103	2	RESISTOR, 10 K, 1/4 W, 5%	01121	RC07GF103J
R28	299701-102		RESISTOR, 1 K, 1/4 W, 5%	01121	RC07GF102J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A8A2R29	299700-513	1	RESISTOR, 51 K, 1/8 W, 5%	01121	RC07GF513J
R30	299701-103		RESISTOR, 10 K, 1/4 W, 5%	01121	RC07GF103J
R31	299701-362	1	RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R32	299700-102		RESISTOR, 1 K, 1/8 W, 5%	01121	RC05GF102J
R33	299761		RESISTOR, VARIABLE, 1 K	94271	502-005-1K
U1	294066	1	INTEGRATED CIRCUIT OP/AMP	27014	LF356N
U2	293354 1	1	INTEGRATED CIRCUIT OP/AMP	72314	UA741C-V
U3	295817-2	2	IC, OUTPUT AMPLIFIER	14482	A35-2
U4	295817-2		IC, OUTPUT AMPLIFIER	14482	A35-2
U5	295817-3	2	IC, OUTPUT AMPLIFIER	14482	A37-2
U6	295817-3		IC, OUTPUT AMPLIFIER	14482	A37-2
1A9	295319-4	1	LOGIC CONVERTER PC BOARD	56872	295319-4
C1	299240-2	2	CAPACITOR, 22 uF, 15V	31433	T368B226M015AS
C2	299240-2		CAPACITOR, 22 uF, 15V	31433	T368B226M015AS
J1	299932	4	HEADER, DOUBLE ROW STRAIGHT POST (26 POS)	00779	1-87227-3
J2	299932		HEADER, DOUBLE ROW STRAIGHT POST (26 POS)	00779	1-87227-3
J3	299932		HEADER, DOUBLE ROW STRAIGHT POST (26 POS)	00779	1-87227-3
J4	299932		HEADER, DOUBLE ROW STRAIGHT POST (26 POS)	00779	1-87227-3
J5	299935	1	HEADER, DOUBLE ROW STRAIGHT POST (16 POS)	00779	87230-8
J6	293083	1	RECEPTACLE, DOUBLE ROW (58 POS)	00779	2-86063-5
R1			NOT USED		
R2			NOT USED		
R3	299701-301	3	RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R4	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R5	299701-301		RESISTOR, 300 Ω, 1/4 W	01121	RC07GF301J
R6			NOT USED		
R7	299701-103	29	RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R8	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R9	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R10	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R11	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R12	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R13	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R14	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R15	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R16	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R17	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R18	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R19	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R20			NOT USED		
R21			NOT USED		
R22	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R23	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R24	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R25	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R26	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R27	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R28	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R29	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R30	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R31	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R32	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R33	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R34	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R35	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R36	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J
R37	299701-103		RESISTOR, 10 K, 1/4 W	01121	RC07GF103J

TABLE 5-1. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1A9TJ	299934	1	HEADER, DOUBLE ROW STRAIGHT POST (16 POS)	02660	87227-8
U1	293356	10	INTEGRATED CIRCUIT	01295	SN74LS157N
U2	293526	9	INTEGRATED CIRCUIT	18324	N82S83B
U3	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U4	293526		INTEGRATED CIRCUIT	18324	N82S83B
U5	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U6	293526		INTEGRATED CIRCUIT	18324	N82S83B
U7	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U8	293526		INTEGRATED CIRCUIT	18324	N82S83B
U9			NOT USED		
U10	293506-2	9	INTEGRATED CIRCUIT	34335	AMD9214
U11	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U12	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U13	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U14	293526		INTEGRATED CIRCUIT	18324	N82S83B
U15	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U16	293526		INTEGRATED CIRCUIT	18324	N82S83B
U17	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U18	293526		INTEGRATED CIRCUIT	18324	N82S83B
U19	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U20	293526		INTEGRATED CIRCUIT	18324	N82S83B
U21	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U22	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U23	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U24	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U25			NOT USED		
U26	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U27	293506-2		INTEGRATED CIRCUIT	34335	AMD9214
U28			NOT USED		
U29	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U30	293526		INTEGRATED CIRCUIT	18324	N82S83B
U31	293356		INTEGRATED CIRCUIT	01295	SN74LS157N
U32	293510	1	INTEGRATED CIRCUIT	34371	HM7611-5
U33	293585	1	INTEGRATED CIRCUIT	34371	HM7611-5
U34	293541-12	1	INTEGRATED CIRCUIT	01295	SN74LS01N
U35	293508	1	INTEGRATED CIRCUIT	34371	HM7603-5
U36	293359	1	INTEGRATED CIRCUIT	01295	SN7437N
U37	293364	1	INTEGRATED CIRCUIT	01295	SN7404N
U38	293361	1	INTEGRATED CIRCUIT	01295	SN7408N
U39	293358	1	INTEGRATED CIRCUIT	01295	SN7425N
1A10	295459-2	1	STATIONARY PANEL, ASSEMBLY	56872	295459-2
J1	295382-1	1	ADAPTER	19505	57-0509-000
J2	294439	1	CONNECTOR, BNC	02660	UG-1094-1050
R1	299794	1	POTENTIOMETER, 1 K	01121	70BIG028P102W
1A11	299292	1	PLUG-IN POWER DISTRIBUTION PC BOARD	56872	299292
1A12	295599	1	ATTENUATOR (182 AND 183 OPTION)	56872	295599
1A13	295683	1	ATTENUATOR CONTROL BOARD (183 OPTION ONLY)	56872	295683
1A14			NOT USED		
1A15	296356-1	1	MIXER	21912	MD525-4
1A16	295678-2	1	FILTER, LOW PASS, 2 GHz	56872	295687-2
1A17	295617	1	FILTER, 3300 MHz	18203	5B120-3300/5500/0
1A18	295644	1	FILTER, 4000 MHz	18203	5B120/4000/3000/0
1A19	295686	1	FILTER, LOW PASS, 4100 MHz	18203	56380-X4000-OP0
1A20	295940-1	1	FILTER, LOW PASS, 4500 MHz	18203	4L250-4500/00

TABLE 5-2. MANUFACTURERS FEDERAL SUPPLY CODE

Vendor Code	Manufacturer	Address
00779	Amp Incorporated	PO Box 3608 Harrisburg, PA 17105
01121	Allen-Bradley Company	1201 South Second Street Milwaukee, WI 53204
01295	Texas Instruments Inc.	PO Box 225012-MS-84 Dallas, TX 75265
02660	Bunker Ramo Corporation Amphenol Connector Division	2122 York Road Oak Brook, IL 60521
04713	Motorola Semi-Conductor Products	PO Box 20912 Phoenix, AZ 85036
14482	Watkins-Johnson Company	3333 Hillview Avenue Palo Alto, CA 94304
14655	Cornell-Dubilier Electronics	150 Avenue L Newark, NJ 07105
15542	Mini-Circuits Lab.	2625 East 14th Street Brooklyn, NY 11235
18203	Englemann Microwave	Skyline Drive Montville, NJ 07045
18324	Signetics Corporation	811 East Arques Avenue Sunnyvale, CA 94086
19505	Applied Engineering Products	1475 Whalley Avenue PO Box A-D Amity Station New Haven, CT 06525
21912	ANZAC Electronics	80 Cambridge Street Burlington, MA 01803
24602	EMC Technology Inc.	1971 Cuthbert Road Cherry Hill, NJ 08034
25403	Amperex Electronic Corporation	San Carlos, CA
27014	National Semiconductor	Santa Clara, CA 95051
28480	Hewlett-Packard Corporation	1501 Page Mill Road Palo Alto, CA 94304

TABLE 5-2. MANUFACTURERS FEDERAL SUPPLY CODE (Cont)

Vendor Code	Manufacturer	Address
29990	American Technical Ceramics	1 Norden Lane Huntington Station, NY 11746
31433	Kemet, Union Carbide Corporation	PO Box 5928 Greenville, SC 29606
32421	Crown Microwave, Inc.	6 Executive Park Drive N. Bellerica, MA 01862
32590	Electrical Instrument Service, Inc.	25 Dock Street Mount Vernon, NY 10550
34335	Advanced Micro Devices Inc.	Box 453 Sunnyvale, CA 94086
34371	Harris Semiconductor	Box 883 Melbourne, FL 32901
50101	GHZ Devices Inc.	16 Maple Road South Chelmsford, MA 01824
50155	Communication Transistor Corporation	301 Industrial Way San Carlos, CA 94070
52648	Plessey Semiconductors	1641 Kaiser Avenue Irvine, CA 92714
56289	Sprague Products Company	481 Marshall Street North Adams, MA 01247
56872	Eaton Corporation Electronic Instrumentation Division	2070 Fifth Avenue Ronkonkoma, NY 11779
71279	Cambridge Thermionic Corporation	445 Concord Avenue Cambridge, MA 02138
72136	Electro Motive Mfg Company	Williamantic, CT 06226
72314	Fairchild Camera and Instrument Corporation	464 Ellis Street Mountain View, CA 94042

TABLE 5-2. MANUFACTURERS FEDERAL SUPPLY CODE (Cont)

Vendor Code	Manufacturer	Address
72982	Erie Technological Products	PO Box 961 Erie, PA 16512
80294	Bourns Inc.	1200 Columbia Avenue Riverside, CA 92507
86684	Radio Corporation of America	Harrison, NJ 69346
91293	Johanson Mfg., Company	Boonton, NJ 07005
94271	Weston Components and Controls	Archbald, PA 18403
95275	Vitramon North America, Division Vitramon, Inc.	PO Box 544 Bridgeport, CT 06601
96341	Microwave Assocs.	Northwest Industrial Park Burlington, MA 01803
98291	Sealectro Corporation	225 Hoyt Street Mamaroneck, NY 10543
99800	Delevan Division American Precision Inds.	270 Quaker Road East Aurora, NY 14052

APPENDIX A
183 ATTENUATOR OPTION

Figure A-1. Front View of P3602.0-183

The 183 Attenuator is an option to the standard P3602.0E1 Plug-In RF Section. This option provides control of the output amplitude over the range of +10 dBm to -136 dBm from the front panel and +10 to -135.5 dBm through the rear panel remote input.

The resolution in the REMOTE Mode is 0.5 dB. The desired output level is programmed via the J4 rear panel connector. The logic is T^2L compatible positive true, and each input represents one T^2L load. Input buffering is not provided, therefore, all input lines except those for the desired attenuation must be held low. Table A-1 lists the J4 pin numbers for output amplitude.

The resolution in LOCAL Mode is essentially infinite. Control of output amplitude is provided in 10 dB steps by a multi-position switch, with finer resolution provided by a calibrated vernier. Table A-2 lists all the important specifications of the P3602.0E1 RF Section with 183 option.

TABLE A-1. J4 PIN NUMBERS FOR OUTPUT AMPLITUDE

J4-18	Amplitude	0.5 dBm
J4-19	Amplitude	1 dBm
J4-20	Amplitude	2 dBm
J4-21	Amplitude	4 dBm
J4-22	Amplitude	8 dBm
J4-23	Amplitude	10 dBm
J4-24	Amplitude	20 dBm
J4-25	Amplitude	40 dBm
J4-26	Amplitude	80 dBm
J4-27	Amplitude	+/-
J4-28	Attenuator Option Flag	
J4-29	Ground	

NOTE

Positive Logic "0" < +.8V, "1" = +2.4 to +5.0 V, + = "1", - = "0"

TABLE A-2. OUTPUT SPECIFICATION WITH 183 ATTENUATOR OPTION USED WITH P3602.0E1 PLUG-IN

Output Level (into 50 ohms)	+10 to -135.5 dbm
Output Accuracy	±2 dB, +10 to -50 dBm ±3 dB, -50 to -110 dBm
Leveling	±1.5 dB
Output Level Switching Time	10 msec (<1 msec for changes on same attenuator range)
Impedance	50 ohms
VSWR	<2.6 above -6dBm <1.4 below -6dBm
Resolution	LOCAL: Output level continuously adjustable REMOTE: Output level programmable in 0.5 dB steps

NOTE

With the 183 option, AM modulation specifications are reduced above +4 dBm.

A3 LEVEL REFERENCE BOARD 296754-2

The level reference board is identical to the 296754-1 with the addition of a 16 line to 4 line decoder U3. The 10 db front panel switch selector, A10S1, is a shorting type switch, and supplies fourteen positive true logic lines to U3, 0 to 130 db, which are decoded into a four line BCD code. In addition U3-24 supplies a $\overline{\text{Key Rollover}}$. This output is normally high, and is low only when two or more outputs are shorted. Since A10S1 is a shorting type switch, U3-24 supplies a negative logic signal whenever A10S1 is rotated. The purpose of this is to cause the RF output to go to its minimum level between switch positions. A strobe output is also supplied from U3-4 which is high only when all input lines are low, and low whenever any input line is high. This is used to detect the +/- logic signal.

These logic signals, the modulation and vernier level signals from U1A and U1B are all fed to the A13 attenuator control board. Figures 4-13 and 4-14 are the schematic and parts location illustrations.

A10 FRONT PANEL ASSEMBLY 295696-2

The front panel assembly includes a single pole multi-position switch in addition to the standard front panel components of 295459-2. This switch selects the output level range in 10 dB steps for LOCAL operation only, and RF PANEL operation on the 380.

A12 ATTENUATOR ASSEMBLY 295599

This assembly consists of a 130 dB step attenuator. Negative 12 volts on any DC input turns on that attenuator section. Zero volts turns it off. There are no adjustments or field replaceable components in this assembly. The attenuator has a minimum insertion loss of 4 dB.

A13 ATTENUATOR CONTROL BOARD 295683

This assembly is a printed circuit board mounted on the rear of A8 in the RF plug-in. Figures A-2 and A-3 are the schematic and parts location illustrations.

All the logic for controlling the attenuator, switching between LOCAL and REMOTE CONTROL of output level, and controlling the Level Reference voltage to the output amplifier in REMOTE, are contained on A13.

Inputs to the Attenuator Control Board are from the A3 level reference board, and the Remote Programming connector J4. The level reference board supplies 4 line BCD positive true logic for the 10 dB steps, and an analog voltage for the level vernier. The inputs from the Remote Programming connector J4 are the 4 line BCD positive true logic for the 10 dB steps, including the +/- signal (+ = "1", - = "0"), and the 4 1/4 digit positive true BCD logic for the 1 db and 0.5 db steps.

The remote 10 db step logic and the local 10 db step logic are multiplexed by U6, which is controlled by the LOC/REM logic signal on U6-1 (LOC = "0", REM = 1). The 1.0 and 0.5 db step remote logic is applied to PROM U4-1, 2, 3, 4 and 5. U4 decodes this logic along with the +/- signal on U4-18, and supplies an 8 bit binary signal to U3, which is a multiplying DAC.

In the local mode, A13K1 is energized, and the analog vernier level voltage from A3U2 enters the attenuator control board at J3-1. The voltage is switched by K1 to J3-3, back to the A3 level reference board at A3J2-6, where it is fed to the output amplifier A8 through A3J4-1.

The local logic signals for the 10 dB steps enters at A13J3-6, 7, 8 and 9, and the Key Roll-over at J3-14. The four bit logic is multiplexed into a PROM, U7 by U6, which is controlled by the LOC/REM signal on U6-1. A13U5 is a QUAD 2-input nand gate connected to multiplex the local and remote +/- logic signals. The local +/- signal is at U5-9 and the remote +/- signal is at U5-1. The LOC/REM control signal is at U5-2, 12 and 13. The multiplexed +/- signal outputs on U5-6.

PROM U7 provides the four logic signals for A12 attenuator relay drivers Q1 through Q8.

The $\overline{\text{Key Rollover}}$ output is generated by A3U3 whenever the 10 db selector switch A10S1 is rotated. This negative true logic signal is applied to inverter U8-9, 10 and the output at U8-8 is applied to switch transistor Q9. U8-8 is normally low and Q9 normally conducting, thereby providing supply voltage to U7. When a $\overline{\text{Key Rollover}}$ pulse is generated, the resulting positive output at U8-8 turns switch Q9 off, removing supply voltage from U6. This causes all outputs of U7 to go low, thereby energizing all relays in attenuator A12, for 130 db of attenuation. The purpose of this is to cause the synthesizer output level to go to a minimum level in-between switch positions.

In the remote mode, relay A13K1 is de-energized and the analog vernier level voltage is supplied from multiplying DAC U3 and amplifiers U1 and U2. The reference voltage for U3, which can also contain the AM modulation signal, is applied at U3-15.

PROM U4 supplies the 8 bit binary signals containing the 1.0 db and 0.5 db steps to U3. When power levels between +10 and +0 dbm are remotely programmed, input logic lines to PROM U7 are all low, and A12 is at minimum attenuation. PROM U4 programs DAC U3 to supply the proper analog voltage to control the A8 output amplifier power to provide output levels, from +14 dbm to +4 dbm. The extra 4 db is necessary to compensate for the 4 db insertion loss of attenuator A12. Potentiometers A13R13 and A13R14 provide the calibration adjustments for the remote mode. Table A-3 provides coding information for U4 between programmed power levels of +10 and -5.5 dbm.

When power levels are remotely programmed between -0 dbm and -5.5 dbm, the input logic lines to U4 are still low, and A12 remain at minimum attenuation. The +/- logic at U4-18 goes low, and the U4 output coding changes as shown in Table A-3. The A8 output amplifier power covers the +4.0 to -1.5 dbm range, compensating for the 4 db insertion loss of A12.

Remote programmed levels between -6.0 and -9.5 dbm are detected by U8. The output of U8, pin 11, is low for levels <6.0 and high for levels ≥6.0. This logic signal is applied to the 10 db control PROM U7-14, which energizes the 10 db attenuator in A12. The U7 coding is given in Table A-4. The required A8 power output for this programmed range is +8.0 to +4.5 dbm.

For remotely programmed levels between -10.0 and -15.5 dbm, the 10 db logic line at J2-3 goes low. The multiplied output at U6-12 goes high and this signal applied to U7-10 causes A12 to remain programmed at 10 db attenuation. In this manner the 10 db step attenuator switches in 10 db steps at programmed levels of -6, -16, -26, etc...dbm, to a maximum of 130 db attenuation.

In the local mode, the output of the ≥6 decoder, U8-11, has no significance, and this level must be held low for proper attenuator programming. Diode CR2 holds this line low when the LOC/REM switch is in LOCAL.

CALIBRATION

REMOTE LEVEL AND REMOTE AM TRACKING CALIBRATION. (360 ONLY)

1. All calibration in RF PANEL or LOCAL mode should be completed before calibrating remote functions. If unit is a 360, switch front panel switch to REMOTE. If unit is a 380, place in keyboard control (RF PANEL light should be out).
2. Lift A9 logic PC board and locate A13 board underneath it. The two variable resistors are R13 (nearest front of unit) and R14 (nearest rear).
3. Program unit for CW mode, frequency of 1 GHz at a power of +5 dBm. Attach power meter to system output. Adjust A13R13 until power meter reads +5 dBm.
4. Program unit for -5 dBm. Adjust A13R14 for -5 dBm reading on power meter.
5. Repeat steps 3 and 4 until both conditions are met.
6. If there is no PM3602 option, apply a 4 kHz sinewave to MOD IN connector and adjust function generator for 0.7V RMS at MOD IN connector. If PM3602 option is installed, program unit for AM mode, EXT. SOURCE, 70% MOD level. Then attach the 4 kHz sinewave to MOD IN connector and adjust function generator for a reading of 0.7V RMS at pin 15 of U3 on PM3602.
7. Program unit to -4 dBm and measure AM. Adjust A13R14 for 70% AM reading.
8. Program unit to +3 dBm and measure AM. Adjust A13R13 for 70% AM.
9. Repeat steps 7 and 8 until 70% AM at +3 dBm and -4 dBm is obtained.

Table A-5 is a list of replaceable parts for the level reference board A3, plug-in panel A10 and attenuator control board A13.

TABLE A-3. A13U4 CODING FOR LEVELS BETWEEN +10 AND -5.5 DBM

PROGRAMMED POWER LEVEL DBM	INPUTS 1	2	3	4	5	17	18	OUTPUTS 6	7	8	9	11	12	13	14	A8 AMPLIFIER POWER OUTPUT LEVEL, DBM
+10.0	0	0	1	0	1	X	1	0	0	0	0	0	1	1	1	+14.0
+ 9.5	1	1	0	0	1	X	1	0	0	1	0	1	0	1	1	+13.5
+ 9.0	0	1	0	0	1	X	1	0	0	0	1	0	0	1	1	+13.0
+ 8.5	1	0	0	0	1	X	1	1	0	1	1	1	1	0	1	+12.5
+ 8.0	0	0	0	0	1	X	1	0	1	0	0	1	1	0	1	+12.0
+ 7.5	1	1	1	1	0	X	1	0	0	0	1	0	1	0	1	+11.5
+ 7.0	0	1	1	1	0	X	1	1	1	1	1	1	0	0	1	+11.0
+ 6.5	1	0	1	1	0	X	1	0	1	1	0	1	0	0	1	+10.5
+ 6.0	0	0	1	1	0	X	1	0	1	1	1	0	0	0	1	+10.0
+ 5.5	1	1	0	1	0	X	1	0	1	1	0	0	0	0	1	+ 9.5
+ 5.0	0	1	0	1	0	X	1	0	1	1	1	1	1	1	1	+ 9.0
+ 4.5	1	0	0	1	0	X	1	1	1	1	0	1	1	1	0	+ 8.5
+ 4.0	0	0	0	1	0	X	1	0	0	0	0	1	1	1	0	+ 8.0
+ 3.5	1	1	1	0	0	X	1	0	1	0	1	0	1	1	0	+ 7.5
+ 3.0	0	1	1	0	0	X	1	0	0	1	0	0	1	1	0	+ 7.0
+ 2.5	1	0	1	0	0	X	1	1	1	1	1	1	0	1	0	+ 6.5
+ 2.0	0	0	1	0	0	X	1	1	0	0	1	1	0	1	0	+ 6.0
+ 1.5	1	1	0	0	0	X	1	0	0	1	0	1	0	1	0	+ 5.5
+ 1.0	0	1	0	0	0	X	1	0	0	0	0	1	0	1	0	+ 5.0
+ 0.5	1	0	0	0	0	X	1	1	1	0	1	0	0	1	0	+ 4.5
+ 0	0	0	0	0	0	X	1	1	1	1	0	0	0	1	0	+ 4.0
- 0	0	0	0	0	0	X	0	1	1	1	0	0	0	1	0	+ 4.0
- 0.5	1	0	0	0	0	X	0	1	1	0	0	0	0	1	0	+ 3.5
- 1.0	0	1	0	0	0	X	0	1	1	1	1	1	1	0	0	+ 3.0
- 1.5	1	1	0	0	0	X	0	0	0	1	1	1	1	0	0	+ 2.5
- 2.0	0	0	1	0	0	X	0	0	0	0	1	1	1	0	0	+ 2.0
- 2.5	1	0	1	0	0	X	0	1	0	1	0	1	1	0	0	+ 1.5
- 3.0	0	1	1	0	0	X	0	0	1	0	0	1	1	0	0	+ 1.0
- 3.5	1	1	1	0	0	X	0	1	1	1	1	0	1	0	0	+ 0.5
- 4.0	0	0	0	1	0	X	0	1	0	1	1	0	1	0	0	+ 0.0
- 4.5	1	0	0	1	0	X	0	0	1	0	1	0	1	0	0	- 0.5
- 5.0	0	1	0	1	0	X	0	0	0	0	1	0	1	0	0	- 1.0
- 5.5	1	1	0	1	0	X	0	0	1	1	0	0	1	0	0	- 1.5

X = don't cure

TABLE A-4. CODING OF A13U7

REMOTE PROGRAMMED LEVEL DBM	INPUTS 10	11	12	13	14	15	OUTPUTS 5	6	7	9	A12 ATTENUATION DB
+ 10.0 to + 0.0	0	0	0	0	0	1	1	1	1	1	0
- 0.0 to - 5.5	0	0	0	0	0	0	1	1	1	1	0
- 6.0 to - 9.5	0	0	0	0	1	0	0	1	1	1	10
- 10.0 to - 15.5	1	0	0	0	0	0	0	1	1	1	10
- 16.0 to - 19.5	1	0	0	0	1	0	1	0	1	1	20
- 20.0 to - 25.5	0	1	0	0	0	0	1	0	1	1	20
- 26.0 to - 29.5	0	1	0	0	1	0	0	0	1	1	30
- 30.0 to - 35.5	1	1	0	0	0	0	0	0	1	1	30
- 36.0 to - 39.5	1	1	0	0	1	0	1	1	0	1	40
- 40.0 to - 45.5	0	0	1	0	0	0	1	1	0	1	40
- 46.0 to - 49.5	0	0	1	0	1	0	0	1	0	1	50
- 50.0 to - 55.5	1	0	1	0	0	0	0	1	0	1	50
- 56.0 to - 59.5	1	0	1	0	1	0	1	0	0	1	60
- 60.0 to - 65.5	0	1	1	0	0	0	1	0	0	1	60
- 66.0 to - 69.5	0	1	1	0	1	0	0	0	0	1	70
- 70.0 to - 75.5	1	1	1	0	0	0	0	0	0	1	70
- 76.0 to - 79.5	1	1	1	0	1	0	1	0	1	0	80
- 80.0 to - 85.5	0	0	0	1	0	0	1	0	1	0	80
- 86.0 to - 89.5	0	0	0	1	1	0	0	0	1	0	90
- 90.0 to - 95.5	1	0	0	1	0	0	0	0	1	0	90
- 96.0 to - 99.5	1	0	0	1	1	0	1	1	0	0	100
-100.0 to -105.5	0	1	0	1	0	0	1	1	0	0	100
-106.0 to -109.5	0	1	0	1	1	0	0	1	0	0	110
-110.0 to -115.5	1	1	0	1	0	0	0	1	0	0	110
-116.0 to -119.5	1	1	0	1	1	0	1	0	0	0	120
-120.0 to -125.5	0	0	1	1	0	0	1	0	0	0	130
-126.0 to -129.5	0	0	1	1	0	0	0	0	0	0	120
-130.0 to -135.5	1	0	1	1	0	0	0	0	0	0	130

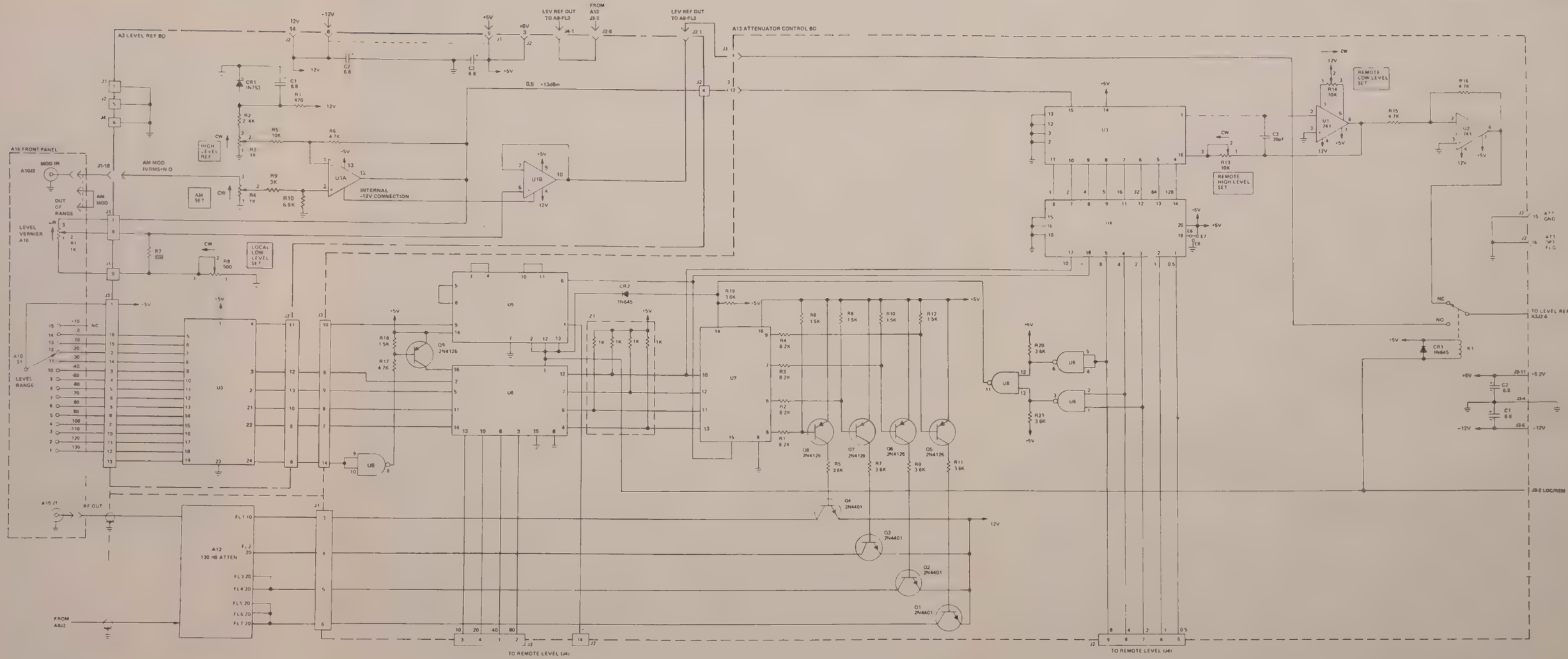


Figure A-2. A13 Attenuator Control Board, Schematic Diagram

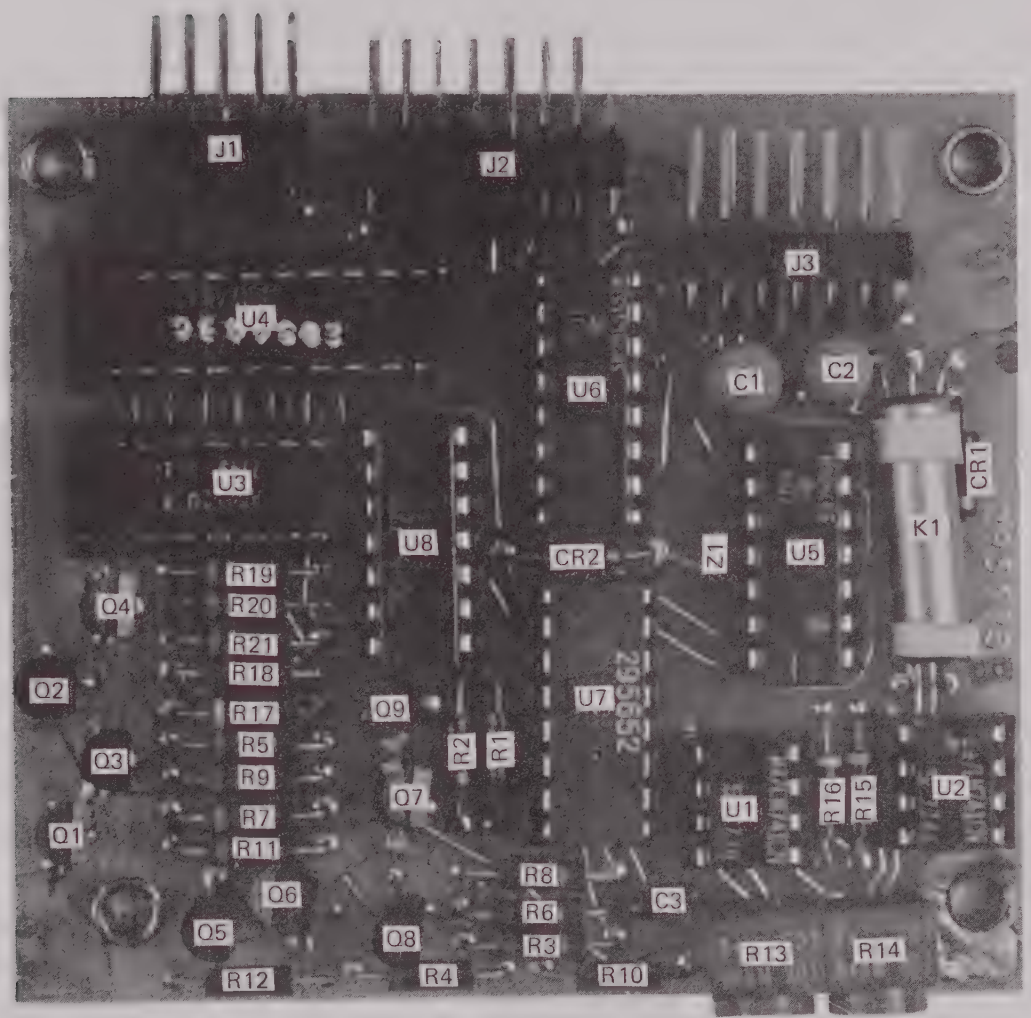


Figure A-3. A13 Attenuator Control Board, Component Locations

TABLE A-5. REPLACEABLE PARTS LIST

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3	296754-2	1	LEVEL REFERENCE BOARD	56872	296754-2
C1	299240-1	3	CAPACITOR, 6.8 uF	31433	T368B685M035AS
C2	299240-1		CAPACITOR, 6.8 uF	31433	T368B685M035AS
C3	299240-1		CAPACITOR, 6.8 uF	31433	T368B685M035AS
CR1	293203-1	1	DIODE, ZENER	04713	1N753A
R1	299701-471	1	RESISTOR, 470 Ω, 1/4 W, 5%	01121	RC07GF471J
R2	299700-242	1	RESISTOR, 2.4 K, 1/4 W, 5%	01121	RC07GF242J
R3	296751-2	2	RESISTOR, VARIABLE, 1K	80294	3299P-1-102
R4	296751-2		RESISTOR, VARIABLE, 1K	80294	3299P-1-102
R5	299700-103	1	RESISTOR, 10 K, 1/4 W, 5%	01121	RC07GF103J
R6	299700-472	1	RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R7	299700-301	1	RESISTOR, 300 Ω, 1/4 W, 5%	01121	RC07GF301J
R8	296751-1	1	RESISTOR, VARIABLE, 500 Ω	80294	3299P-1-501
R9	299700-302	1	RESISTOR, 3 K, 1/8 W, 5%	01121	RC05GF302J
R10	299700-682	1	RESISTOR, 6.8 K, 1/8 W, 5%	01121	RC05GF682J
U1	293484	1	OPERATIONAL AMPLIFIER	72314	UA747CA
U3	293522-1	1	INTEGRATED CIRCUIT	72314	HD0165-5
A10	295696-2	1	PANEL, STATIONARY	56872	295696-2
J1	295382	1	ADAPTER	56872	57-0509-000
J2	294439	1	CONNECTOR	02660	UG1094-1050
R1	294046	1	POTENTIOMETER, 1 K, 10%	01121	70B1G03VR102W
S1	295503-4	1	SWITCH, MODIFIED	56872	295503-4
A13	295683	1	ATTENUATOR CONTROL ASSY	56872	295683
C1	299240-1	2	CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C2	299240-1		CAPACITOR, ELECTROLYTIC, 6.8 uF	31433	T368B685M035AS
C3	299241-200	1	CAPACITOR, DIPPED, 20 pF	72136	DM5CC-200J
CR1	293200	2	DIODE	72314	1N645
CR2	293200		DIODE	72314	1N645
J1	294213	1	HEADER, RIGHT ANGLE, 10 PIN	00779	87230-5
J2	299935	1	HEADER, RIGHT ANGLE, 16 PIN	00779	87230-8
J3	294214	1	HEADER, RIGHT ANGLE, 14 PIN	00779	87230-7
K1	294197	1	RELAY SPDT	32590	2275-5
Q1	294157	4	TRANSISTOR	04713	2N4401
Q2	294157		TRANSISTOR	04713	2N4401
Q3	294157		TRANSISTOR	04713	2N4401
Q4	294157		TRANSISTOR	04713	2N4401
Q5	294153	5	TRANSISTOR	04713	2N4126
Q6	294153		TRANSISTOR	04713	2N4126
Q7	294153		TRANSISTOR	04713	2N4126
Q8	294153		TRANSISTOR	04713	2N4126
Q9	294153		TRANSISTOR	04713	2N4126
R1	299701-822	4	RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R2	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R3	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R4	299701-822		RESISTOR, 8.2 K, 1/4 W, 5%	01121	RC07GF822J
R5	299701-362	7	RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R6	299701-152	5	RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J

TABLE A-5. REPLACEABLE PARTS LIST (Cont)

Reference Designation	AILTECH Part Number	Qty	Description	Mfr Code	Mfr Part Number
A13R7	299701-362		RESISTOR, 3.6 K, 1/4, 5%	01121	RC07GF362J
R8	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R9	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R10	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R11	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R12	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R13	294484	2	RESISTOR, VARIABLE, 10 K	80294	3262P-1-103
R14	294484		RESISTOR, VARIABLE, 10 K	80294	3262P-1-103
R15	299701-472	3	RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R16	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R17	299701-472		RESISTOR, 4.7 K, 1/4 W, 5%	01121	RC07GF472J
R18	299701-152		RESISTOR, 1.5 K, 1/4 W, 5%	01121	RC07GF152J
R19	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R20	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
R21	299701-362		RESISTOR, 3.6 K, 1/4 W, 5%	01121	RC07GF362J
U1	293354-1	2	INTEGRATED CIRCUIT	72314	UA741CV
U2	293354-1		INTEGRATED CIRCUIT	72314	UA741CV
U3	293514	1	INTEGRATED CIRCUIT	72314	AD752DJN
U4	295445	1	INTEGRATED CIRCUIT PROGRAMMABLE ROM	01295	SN74S471N
U5	293366	1	INTEGRATED CIRCUIT	01295	SN7400
U6	293356	1	INTEGRATED CIRCUIT	01295	7NLS157
U7	295652	1	INTEGRATED CIRCUIT PROGRAMMABLE ROM	01295	7603-5
U8	294493	1	INTEGRATED CIRCUIT	01295	SN7403
XU1	294565	3	SOCKET, IC, 8 PIN	01295	C930810
XU2	294565		SOCKET, IC, 8 PIN	01295	C930810
XU3	294567	3	SOCKET, IC, 16 PIN	01295	C931610
XU4a	294573	2	SOCKET, IC, 14 PIN	01295	C931410
XU4b	294565		SOCKET, IC, 8 PIN	01295	C930810
XU5	294573		SOCKET, IC, 14 PIN	01295	C931410
XU6	294567		SOCKET, IC, 16 PIN	01295	C931610
XU7	294567		SOCKET, IC, 16 PIN	01295	C931610
Z1	294472	1	RESISTOR NETWORK	80294	4306R-101-102

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